



**Ministry of Higher Education
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College of Medicine**

Fatty Liver among Diabetic Patients

A Graduation Project Report

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قال تعالى

بسم الله الرحمن الرحيم

{يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ}

صدق الله العلي العظيم

أحمد الله عزَّ وجل الذي وفقني لإتمام هذا البحث العلمي و متعني بالصحة والعافية ومدني بالعزيمة ، فله الحمد حمداً طيباً كثيراً.

إهداء ؛

إلى اعز الناس وأقربهم الى قلبي ، إلى معنى الحب و

الحنان ، إلى من كان دعاؤها سر نجاحي **أمي الغالية**.

إلى من كلله الله بالهيبة والوقار ، إلى من افتخر أني أحمل

أسمه ، إلى من كان وما زال سندي ووسام عزتي **أبي العزيز**.

إلى الداعم الأول ومصدر قوتي إخوتي علي ، أحمد ، حسين ، حسن ، داود.

إلى سندي ومصدر فرحي أختي وصديقتي الأولى سارة.

إلى رفيقات دربي وأغلى ما أهدتني الحياة صديقتي إيمان قيس و نور ثائر.

كما وأود أن أتقدم بالشكر إلى استاذي و مشرفي و موجهي الفاضل الأستاذ

الدكتور علي موسى جعفر ، أتقدم له بجزيل الشكر لأختياره هذا الموضوع

وتوجيهه وتشجيعه المستمر ومتابعته للبحث حتى ظهر بأحسن صورة.

كذلك الشكر الى الدكتور علي ثامر الذي ساعدني في إتمام هذا البحث و كان له

فضل كبير.

وكذلك الشكر الى الدكتورة عائشة أحمد لها فضل كبير بتوجيهي ومساعدتي

لأكمال البحث.

كما وأتقدم بالشكر لجميع الأساتذة والزملاء والصديقات الذين قدموا لي

التشجيع و المساعدة مهما كانت طبيعتها .

الطالبة : زهراء سلمان داود



Abstract

Background .

Type 2 diabetes mellitus (T2DM) is associated with a high prevalence of non-alcoholic fatty liver disease (NAFLD), which is probably due to the condition's high prevalence of obesity and insulin resistance. Although NAFLD can cause hepatomegaly and abnormal liver function in type 1 DM (T1DM), it must be distinguished from the more frequent glycogen hepatopathy. In obese diabetic subjects, weight loss from diet and exercise is effective in preventing and treating NAFLD. Having been shown to stop the progression of NAFLD in T2DM patients, bariatric surgery and recently approved weight loss drugs should also be considered.

Aims of study :

- The aim of study was determine the fatty liver among diabetic patients.
- To determine the stage of fatty liver in diabetic patients and it's relation to body weight, control diabetes, duration of diabetes and lipid profile state.

Patients and method .

A cross sectional study were done in Baqubah teaching hospital between november 2022 to march 2023 . A sample of 100 patient with fatty liver and have diabetes mellitus collected randomly .

Result .

50-59 age group were the major age group 35(35%) followed by 60- 69 age group by 31(31%) percentage , 70-79 age group were 24(24%) patient and 80-89 age group by 10 (10%) patients . 53% of sample were male while 47% were female . 63% of patient were live in urban while 37% were live in rural . 19% of the sample were high level of education while 81% were low level of education . The smoker were 38% of the sample .About the weight 59% were high weight and 36% were normal weight and 5% were low weight. 83% of patient were have family history of fatty liver and 84% with chronic

diseases . About the diabetes history 95% control the disease and the mean age of onset of diabetes were 53.7+10.4 and the duration of the disease were 21% less than 5 years and 42 % were between 5-10 years and 37% were more than 10 years. the mean value of cholestrol 195.7 mg/dl and triglyceride 261.14mg/dl and LDL were 42.57mg/dl and HDL were 203.1mg /dl . that mean value of FBS 130.98 mg/dl and HbA1C were 9.40 % and mean RBS 279.95 mg/dl .

Conclusions .

We conclude that there relationship between age , residence , level of education ,weight , family history ,chronic diseases , lipid profiles , blood tests(FBS, RBS ,HbA1C) , some liver function tests (AST , total bilirubin , direct bilirubin) with fatty liver disease .

Keywords : Fatty liver , diabetes , Baqubah .

Introduction

This review focuses on the relationship between NAFLD and diabetes mellitus (DM). Hepatic steatosis that is not caused by drinking alcohol is a hallmark of NAFLD, as its name suggests. Hepatocytes exhibit an excessive accumulation of lipids (mostly triglycerides) when histologically examined, such as in a liver biopsy specimen. Rarely, NAFLD can progress from steatosis to cirrhosis (hepatic fibrosis), steatohepatitis (with symptoms of inflammation and cell damage), and finally liver failure.(1)

It is helpful to divide NAFLD into the categories of non-alcoholic steatohepatitis (NASH) and non-alcoholic fatty liver (NAFL) in order to evaluate the severity of the disease and risk of progression to cirrhosis. Histologic distinctions exist between the two entities.(2)

In contrast to NAFL, which only involves steatosis, NASH involves hepatic inflammation. NAFL and NASH are both parts of a continuum in which steatosis or steatohepatitis are frequently present but not always. An NAFLD activity score (NAS), which assigns numerical values to various histologic measures of steatosis, inflammation, cell injury, and fibrosis, has been developed as one method of determining the extent and severity of the disease.(3)

Patients can then be categorized as having NAFL, borderline NASH, or fully developed NASH based on the resulting cumulative score. Since patients with NASH are much more likely to progress to clinically significant cirrhosis, portal hypertension, and liver failure, it is important to distinguish between NAFL and NASH. Additionally, there is an elevated risk of hepatocellular carcinoma that is several times higher when cirrhosis occurs in conjunction with NAFLD.(4)

The majority of NAFLD patients are asymptomatic, and they are usually diagnosed when abnormal liver tests are discovered during routine laboratory evaluation. The levels of the liver enzymes aspartate aminotransferase and alanine aminotransferase are particularly high. However, not all cases of

NAFLD may have elevated levels of these enzymes, and the level of aminotransferases does not always accurately indicate the degree of inflammation and cirrhosis.(5)

Association between NAFLD with DM .

The prevalence of NAFLD, which is a very common disorder, has been rising globally. According to a population-based analysis conducted using data from the United States National Health and Nutrition Examination Survey, the proportion of the United state population suffering from NAFLD has been rising over the past 20 years. Although the figures vary between epidemiologic studies, the median prevalence in the US and globally is around 20%, and it is probably even higher in Asia.(6)

Hepatitis A, B, and C, autoimmune hepatitis, hemochromatosis, and hypothyroidism are just a few of the conditions that can cause hepatic steatosis and steatohepatitis. However, the epidemiologic and pathophysiologic connections between type 2 diabetes (T2DM) and obesity are largely to blame for the rise in the prevalence of NAFLD. It has been calculated that more than 70% of obese adults with T2DM also have NAFLD. In 20% of children with T2DM, alanine aminotransferase has been found to be more than twice normal, and this is typically attributed to NAFLD.(7)

T2DM is characterized in the majority of affected people by the simultaneous development of resistance to insulin's actions in the body's target tissues and a failure of the beta cells in the pancreatic islets to secrete enough insulin to overcome this resistance. It is thought that a combination of genetic and environmental factors caused these abnormalities. With more than 40 associated gene variants identified so far, which collectively have a negligible effect on the risk of diabetes, there appear to be numerous genetic factors that predispose to T2DM.(8)

Many of the associated genes are involved in pathways related to beta cell development or function, even though the molecular processes linking the majority of these genes to the onset of T2DM are not fully understood. Increased calorie consumption and decreased physical activity, both of which contribute to the emergence of obesity and insulin resistance, are the most important environmental determinants.(9)

Over the past few decades, changes in food consumption and exercise habits among many populations around the world—often tied to growing urbanization—have fueled an epidemic rise in obesity and T2DM. Worldwide, there are close to 400 million people with diabetes, 90% of whom have T2DM, according to data from the International Diabetes Federation.(10)

Pre-diabetes, which is indicated by mildly elevated fasting or postprandial glucose, affects an additional 316 million people and puts them at a high risk of developing T2DM. In people with both pre-diabetes and overt T2DM, the prevalence of NAFLD is higher.(11)

The majority of NAFLD patients also exhibit other clinical features that make them candidates for the metabolic syndrome diagnosis, in addition to the association with disordered glucose metabolism. Any three of the following five abnormalities—abdominal obesity (increased waist size or waist/hip ratio), impaired glucose tolerance or overt diabetes, elevated triglycerides, low high-density lipoprotein cholesterol, and elevated blood pressure—are considered to constitute the metabolic syndrome.(12)

Methodology

A descriptive cross-sectional study was conducted between november 2022 to march 2023 on patient who admitted Baqubeh teaching hospital with fatty liver disease and having diabetes mellitus . a sample of 100 patient was calculated and randomly collected . we conducted the study by using prepared written questionnaire . we asked them questions containing age , chronic diseases,duration of diabetes , controlling the diabete ,family history age of onset , weight . Exclusion criteria was alcoholic fatty liver , non diabetes patient with fatty liver disease , hypothyroidism , hyper lipidemia without diabetes mellitus .

Statistical analysis .

After collection, data were checked manually and analyzed by laptop based program Statistical package of social science(SPSS) 26 version. Results were expressed as mean \pm SD, or number or percentage. t-test was used for comparison of continuous variable data. *P* value < 0.05 was considered as statistically significant.

Results

One hundred patients who visited in Baqubah teaching hospital . 50-59 age group were the major age group 35(35%) followed by 60- 69 age group by 31(31%) percentage , 70-79 age group were 24(24%) patient and 80-89 age group by 10 (10%) patients . 53% of sample were male while 47% were female . 63% of patient were live in urban while 37% were live in rural . 19% of the sample were high level of education while 81% were low level of education . The smoker were 38% of the sample .About the weight 59% were high weight and 36% were normal weight and 5% were low weight .

Table(1) : Demographic characteristics of the sample .

Characteristics	Frequency	Percentage
Age		
50-59	35	35%
60-69	31	31%
70-79	24	24%
80-89	10	10%
Gender		
Male	53	53%
Female	47	47%
Residence		
Urban	63	63%
Rural	37	37%
Level of education		
High level	19	19%
Low level	81	81%
smokers	38	38%
Weight		
Normal weight	36	36%
High weight	59	59%
Low weight	5	5%

Relation between fatty liver stages with obesity

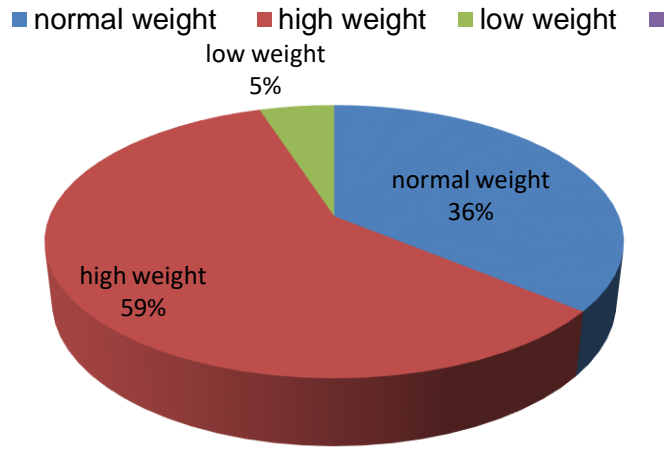


Table (2) show that 83% of patient were have family history of fatty liver and 84% with chronic diseases . About the diabetes history 95% control the disease and the mean age of onset of diabetes were 53.7+10.4 and the duration of the disease were 21% less than 5 years and 42 % were between 5-10 years and 37% were more than 10 years .

Table 2: medical history of the sample .

Medical history	Frequency	Percentage
Family history	83	83%
Chronic disease	84	84%
Control the diabetes	95	95%
Duration diabetes		
<5 years	21	21%
5-10 years	42	42%
>10 years	37	37%
Onset of diabetes (mean age + S.D)	53.7 + 10.4	

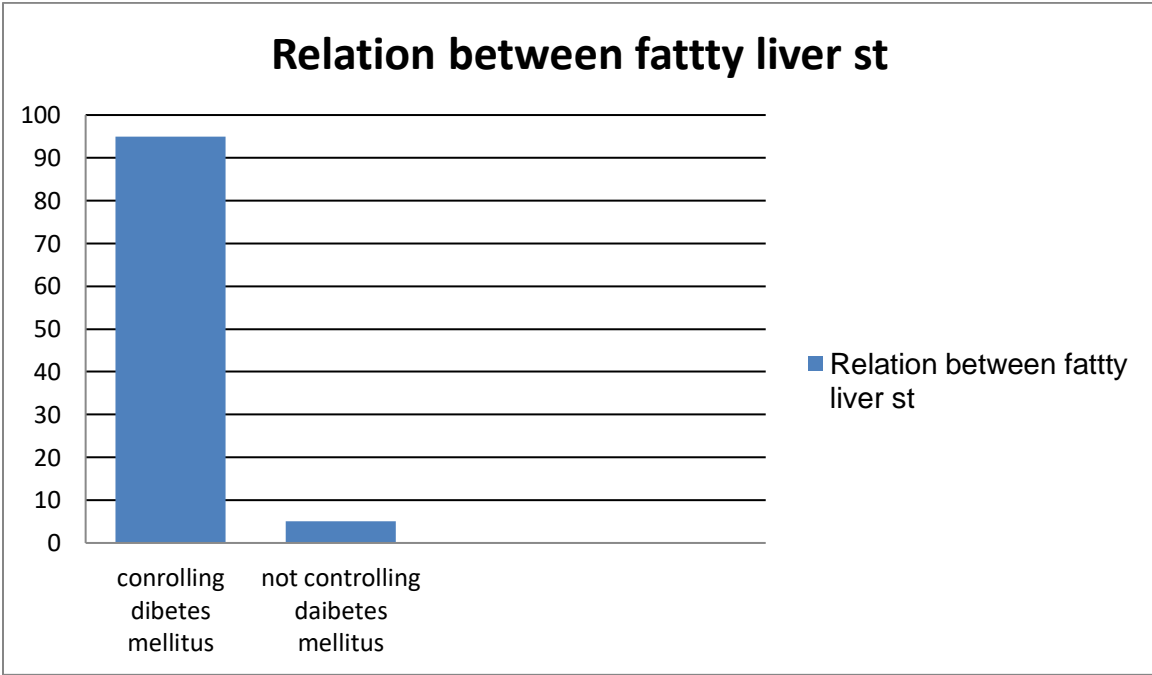
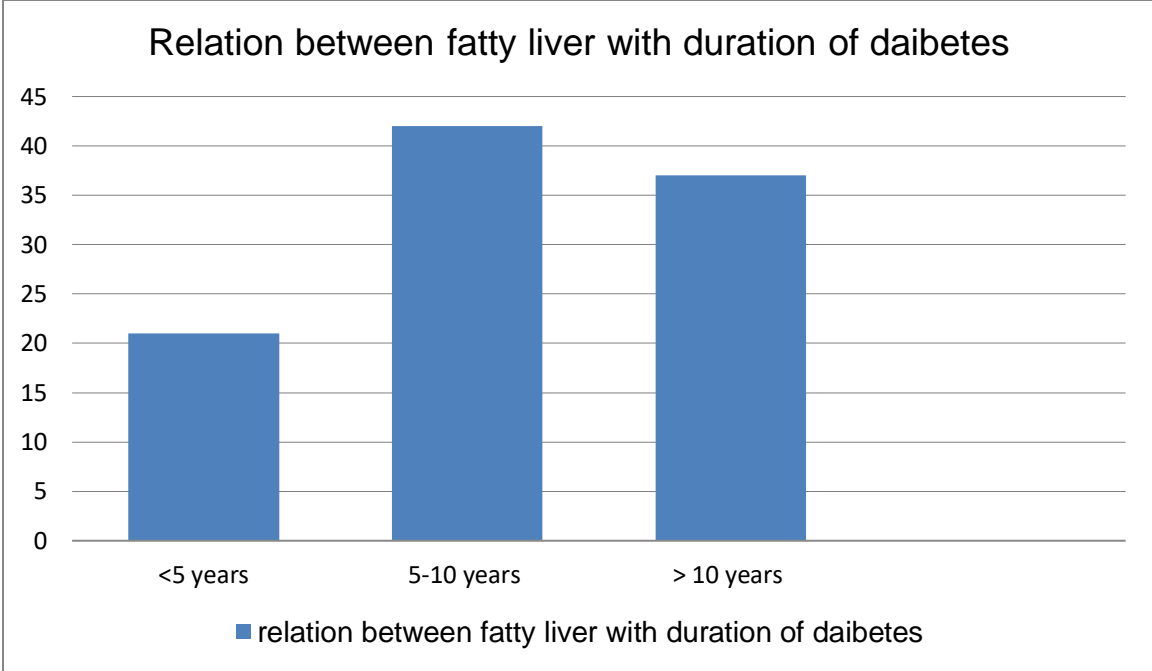


Table (3) determine the grading of fatty liver where grade 1 were 43% , 34%were grade 2 and 23% were grade 3.

Table 3 : grading of fatty liver .

Grade	Frequency	Percentage %
Grade 1	43	43%
Grade 2	34	34%
Grade 3	23	23%
Total	100	100%

Table(4) show the mean value of cholesterol 195.7 mg/dl and triglyceride 261.14mg/dl and LDL were 42.57mg/dl and HDL were 203.1mg /dl .

Table 4 : lipid profile in fatty liver patient

Lipid profile	Mean + SD	Minimum	Maximum	P value
Cholesterol (ml/dl)	195.71+ 40.8	73ml/dl	299ml/dl	0.003
Triglyceride(ml/dl)	261.14+65.6	162 ml/dl	380ml/dl	0.001
LDL(ml/dl)	42.57+5.5	34 ml/dl	55 ml/dl	0.002
HDL(ml/dl)	203.1+76.6	61 ml/dl	377 ml/dl	0.001

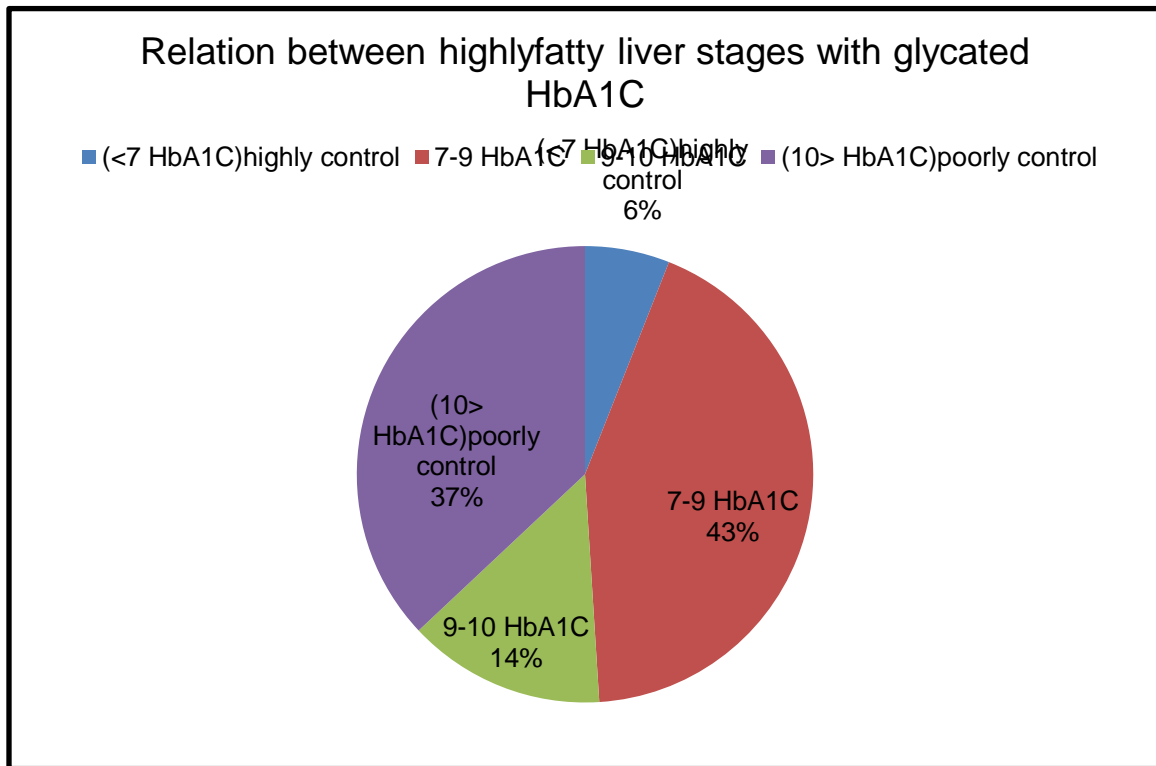
All lipid profile have strong relationship with fatty liver.

Table (5) show that mean value of FBS 130.98 mg/dl and HbA1C were 9.40 % and mean RBS 279.95 mg/dl .

Table (5) : blood tests in fatty liver patients

Blood tests	Mean + SD	Minimum	Maximum	P value
FBS(mg/dl)	130.98+ 4.81	120mg/dl	145mg/dl	0.004
HBA1C%	9.40+2.156	5.27	13.00	0.001
RBS(mg/dl)	279.95+84.47	195mg/dl	496mg/dl	0.003

There strong relationship between all blood testes (FBS,HBA1C , RBS) with fatty liver (P Value <0.05) , t –test.



In this table (6) we found the mean of the ALT 53.57U/L and the mean of the AST were 46.3 U/L and total bilirubin 2.07 and the mean of the urea 47.42 mg/dl and creatinine 1.57 mg/dl .

Table (6) : liver function test in fatty liver patient .

Liver function test	Mean + SD	Minimum	Maximum	P value (correlation coefficient)
ALT(U/L)	53.57+16.93	28 U/L	92U/L	0.234
AST (U/L)	46.3+14.59	20 U/L	83U/L	0.045
Total bilirubin	2.07+ 0 .64	0.8	3.30	0.016
Direct bilirubin	1.34+ 0.59	0.2	2.70	0.012
Urea (mg/dl)	47.42+37.74	16.84 mg/dl	204 mg/dl	0.133
Creatinine (mg/dl)	1.57+1.39	0.58 mg/dl	7.5 mg/dl	0.971

Discussion

Nonalcoholic fatty liver disease (NAFLD) encompasses a wide spectrum of conditions ranging from simple hepatic steatosis to nonalcoholic steatohepatitis (NASH) convincingly. NASH is the only subtype of NAFLD that has been shown to progress relatively, although these findings were reported from studies with short follow-up periods.(13)

In this study we found the major age group were 50-59 35% and major gender were male 53% and the major residence were urban 63% , the level of education were low level 81% , the smoker were 38% of the sample and the major of weight were high weight 59% . The findings of age group and level of education and smoker were agree with study of Birkenfeld et al.(14) and our findings of gender and residence agree with findings of Bhatt et al .(15)

About the medical history , we found the major of the patients have family history of fatty acid 83% , and the major of them have chronic diseases 84% . This findings similar to study done south korea by Kim et al .(16)

95% of patients have control there diabetes , major of them have diabetes from 5-10 years 42% and the mean age of onset 53.7 years this findings agree with study done in Britain by McCullough.(17)

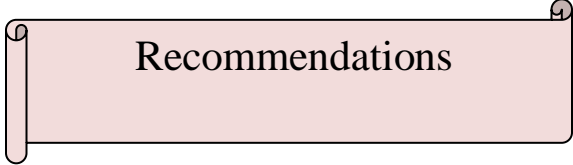
There were significant association between lipid profile (cholesterol , triglyceride , HDL ,LDL) value with fatty liver disease , and there were association between (FBS , HbA1C , RBS) value with fatty liver disease and this agree with study of Rafiq et al .(18)

In liver function tests we found only association between (AST , total bilirubin , direct bilirubin) values with fatty liver disease , we not found study agree exactly with our findings where all studies found relationship the all liver function tests and fatty liver disease may due to the sample were little in compare with other studies .(19, 20).

Conclusion

We conclude that:

- 1- There relationship between fatty liver and age.
- 2- There relationship between fatty liver and residence.
- 3- There relationship between fatty liver and level of education .
- 4- There relationship between fatty liver and weight .
- 5- There relationship between fatty liver and family history .
- 6- There relationship between fatty liver and chronic diseases .
- 7- There relationship between fatty liver and lipid profiles .
- 8- There relationship between fatty liver and blood tests(FBS, RBS ,HbA1C) .
- 9- There relationship between fatty liver and some liver function tests (AST , total bilirubin , direct bilirubin) .



Recommendations

- 1-We recommended more studies about this topic with larger sample size , 2- Increase knowledge of people about risk factor and prevention of this disease , control the diabetes as possible , reduction of weight .
- 3- the patient should aim for BMI of 18.5-34.9 , losing the weight can remove some fat from the liver .
- 4- The patient should eat healthy diet (diet high in fruits , vegetables , protein ,carbohydrate , but low in fat , sugar , and salt).
- 5- The patient should stop smoking , this can reduce the risk of problem such as heart attack and strokes.

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