Correlation between Liver function tests, lipid profile and fibroscan in non-alcoholic fatty liver disease

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Abstract

Background: NAFLD is considered hepatic manifestation of metabolic syndrome, associated with multiple metabolic disturbances as diabetes and hyperlipidemia using Fibroscan as screening tool for steatosis and fibrosis in NAFLD patients.
Objectives: The aim of this study is to elucidate the Correlation between Liver function test, Lipid Profile, Fibroscanin NAFLD.
Patients and methods: this Prospective Cohort study conducted on 50 subjects with NAFLD and 15 Healthy subjects. Blood samples were obtained for liver function tests (ALT,AST, serum total bilirubin, serum direct bilirubin), lipogram, serology, fasting Blood glucose and HBA1c also abdominal ultrasonography and Fibrscan were done.
Results: This study included 65persons that subdivided in to two groups 50 NAFLD patients and 15 healthy volunteer. With mean age of studied patients was 42 years and 32.3% were males and 67.7% were female. We found statistically significant higher values in NAFLD subjects as regard Diabetes mellitus, HBA1c and hypertension than in healthy subjects (p value .003, 0.001,0 .003) respectively. NAFLD subjects showed statistically moderately significant higher values as regard lab investigations (Triglycerides (TriGs), High density lipoprotein(HDL),ALT,AST, Direct bilirubin(Bili-D), Fasting blood glucose(FBG)), p value (.001) and show statistically significant lower value as regard cholesterol (p value = .004) compared to non NAFLD group. Regression analysis was done and revealed that fibroscan could predict the presence of NAFLD.
Conclusion: there is strong relationship between liver function tests, lipid profile and fibroscan and diagnosis of NAFLD.
Keywords: Non alcoholic fatty liver disease (NAFLD); Fibroscan; Lipid profile; Liver function tests.

DOI: 10.21608/svuijm.2020.48106.1024
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Received: 29 October,2020.
Revised: 9 Novembre,2020.
Accepted: 10 Novembre,2020
Cite this article as: Ali A. Ghweil, Hassan S. Mahmoud, Mohamed Elsenbesy , Amal Shahat Mohammed (2023). Correlation between Liver function tests, lipid profile and fibroscan in non-alcoholic fatty liver disease. *SVU-International Journal of Medical Sciences*. Vol.6, Issue 1, pp: 160-165.

Introduction

The prevalence of Non alcoholic fatty liver disease (NAFLD) has been estimated 20-30% of liver diseases (**Browning et al., 2004**). NAFLD includes variety of hepatic diseases ranging from simple steatosis to nonalcoholic steatohepatitis (NASH), cirrhosis and hepatocellular carcinoma (**Salamone et al., 2010**).NAFLD is associated with insulin resistance, obesity, dyslipidemia, type 2 diabetes and coronary artery disease (**Choi et al., 2009**).

NAFLD is believed to be a hepatic manifestation of metabolic syndrome (**Speliotes et al., 2010**). The risk of NAFLD, inflammation, oxidative stress was found to be decreased by high serum bilirubin. (**Changet al., 2012**).

The prevalence rate of NAFLD increases with increasing body mass index (BMI)(**Ruhl et al.,2003**).

An easy, rapid, accurate, and noninvasive screening test is needed to select the small fraction of NAFLD patients for liver biopsy. Fibroscan (transient elastography) measures liver stiffness through estimation of speed of propagation of a shear wave through liver tissue (**Al-Ghamdi.,2007**)

The value depends on the viscoelastic properties of the liver.

Patients and methods

Patients

Fifty patients who discovered accidently during routine examination by abdominal ultrasonography to be bright liver and also fifteen persons who have normal abdominal ultrasonography.

The study was approved by the Scientific and Ethical Committees at Faculty of Medicine, South Valley University.

Inclusion criteria

In that study we initially select persons with age above 18 years old and have done serum bilirubin level and abdominal ultrasonograghy.

Grades of fatty liver in ultrasonography are as follows:

Grade1: When the echogenicity is just increased

Grade II: when the echogenic liver obscures the echogenic walls of portal vein branches

Grade III: when the echogenic liver obscures the diaphragmatic borders **(Saadeh et al., 2002**)

Exclusion criteria

Persons in that study must be excluded from other potential causes of chronic liver disease, including those with excessive alcohol consumption(>20 g/day),those with hepatitis B virus, those with hepatitis C virus, or those with some other history of hepatitis, as identified by detailed medical history taking and a questionnaire (Wilson's disease, hemochromatosis, autoimmune hepatitis, and primary biliary cirrhosis). We also will exclude persons who had taken medications known to have a potential to provoke fatty liver in the past year. Persons with chronic medical diseases, such as coronary artery disease, and malignancy will also be excluded.

Methodology

All patients and normal persons were subjected to the following:

I. History and Clinical Examination: -

1- complete history taking include personal history of age, sex, history of special habits especially about alcohol intake and also medical history of causes of chronic liver disease,

2- Full clinical examination: which include manifestations of chronic liver disease (such as jaundice, flapping tremors, lower limb

edema, organomegaly, ascites) and obesity by measuring waist circumference and mid arm circumference

II. Laboratory Investigations: Blood samples were collected from patients and submitted to the following:

1- Liver function tests include Serum bilirubin, aspartate aminotransferase (AST), alanine aminotransferase (ALT)
2- Lipid profile include serum triglycerides, cholesterol and HDL
3- Serology for Hepatitis B surface antigen, and hepatitis C virus antibodies.
4- Fasting Blood Glucose and HBA1c

III. Imaging: - Included patients were submitted to screening with the following procedures:

1- Abdominal ultrasonography using the following grading to determine degree of brightness of the liver

2- Fibro scan

Statistical Analysis

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science (SPSS 25). Data was presented and suitable analysis was done according to the type of data obtained for each parameter.

i. Descriptive statistics

1. Mean and Standard deviation (± SD) for parametric numerical data, while Median and Interquartile range (IQR) for non-parametric numerical data.
2. Frequency and percentage of non-numerical

ii. Analytical statistics

1. Student T Test was used to assess the statistical significance of the difference between two study group means.
2. Mann Whitney Test (U test) was used to assess the statistical significance of the difference of a non-parametric variable between two study groups.
3. Chi-Square test was used to examine the relationship between two qualitative variables
4. Fisher's exact test was used to examine the relationship between two qualitative variables when the expected count is less than 5 in more than 20% of cells

P- value: level of significance

-P>0.05: Non significant (NS).

-P< 0.05: Significant (S).

-P<0.01: Highly significant (HS).

Results

This study included 50 persons NAFLD and 15 healthy persons. Mean age for all studied subjects was 40.38, 21 persons were males and 44 were females, waist circumference mean was 95.61 and mid arm circumference was 31.63**,(Table 1**)

Table 1. Demographic data for all studied subjects.

Variables		Mean / N	SD / %	Median (IQR)
Age		40.38	12.87	42(28-50)
sex	Male	21	32.3%	
	Female	44	67.7%	
Waist circumference		95.61	29.78	107(96-114)
Midarm circumference		31.63	8.296	34(29-37)

Sex expressed as number and percentage while other parameters expressed as mean±SD.

We found statistically significant higher values in NAFLD subjects as regard diabetes mellitus, HbA1c and hypertension than in healthy subjects (p.value .003, 0.001,0 .003) respectively, (**Table2**).

Table 2. Co morbidities among the studied groups

Variables		NAFLD	healthy	P-Value
		Mean ± SD N (%)	Mean ± SD N (%)	
DM	Diabetic	20(100)	0(0%)	.003
	Non-Diabetic	30(66.7%)	15(33.3%)	
HBA1c		6.08±1.28	4.7±.254	.001
HTN	Hypertensive	19(100)	0(0%)	.003
	Non-hypertensive	31(67. %)	15(32. %)	

NAFLD subjects showed statistically moderately significant higher values as regard lab investigations (TriGs, HDL,ALT, AST, Bili-D,FBG) p value (.001) and show statistically significant lower value as regard cholesterol (p value = .004) compared to non NAFLD group.

There was no significant difference between both groups as regard total serum bilirubin.

NAFLD subjects showed statistically mild significant higher value as regard fibrosis degree (p value= 0.011), and become moderately significant higher value as regard steatosis (p value =.001).

The discriminant ability of fibroscan using degree of steatosis (S) in predicting NAFLD: AUC = .964, 95% confidence level (.956-1), p value = 0.001 , cut –off value at 0.5 , sensitivity 98% and specificity 93.3%, (**Fig.1.**).

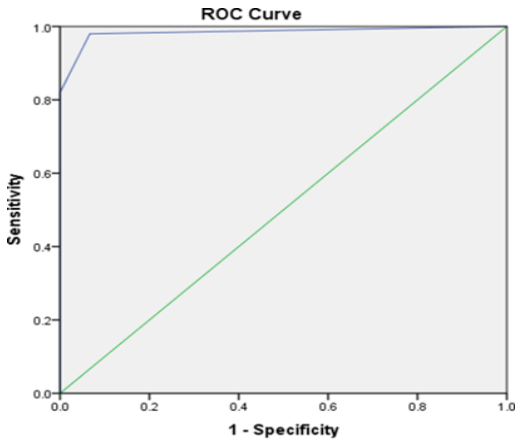

Fig.1. ROC characteristics of in fibroscan predicting NAFLD

Discussion

NAFLD includes variety of hepatic diseases ranging from simple steatosis to nonalcoholic steatohepatitis (NASH), cirrhosis and hepatocellular carcinoma (**Salamone et al., 2010**).

NAFLD is associated with insulin resistance, obesity, dyslipidemia, type 2 diabetes, and coronary artery disease (**Choi et al., 2009**).

Therefore, it is believed to be a hepatic manifestation of metabolic syndrome (**Speliotes et al., 2010**).

Nonalcoholic fatty liver disease (NAFLD) is defined as hepatic steatosis with no secondary hepatic fat accumulation, including alcoholic consumption, steatogenic medication or hereditary disorders (**Chalasani et al.,2012**).

In the current study, there was statistically significant higher values forage, waist and mid arm circumference in NAFLD group compared to non NAFLD group.

Being overweight or obese was found in the vast majority of the patients (84%). there is a direct correlation between obesity and the severity of steatosis (**Sanyal., 2002).**

Waist circumference relates to the amount of visceral adipose tissue and is predictive of comorbidities, for example, obesity, hypertension and diabetes mellitus, about the pathogenesis of insulin resistance and glucose intolerance**.**

The same result was obtained by **Panget al. (2015)** who reported that recentstudy showed that patients with central obesity (higher WC level) had a higher risk of NAFLD than individuals with general obesity (higher BMI level), **Pang et al. (2015**).

Kyung et al. (2016) reported that strong relationship between WC and development of NAFLD after adjusting cardiometabolic markers.

In the current study, we observed association of diabetes mellitus, hypertension with NAFLD patients. We noted statistically significant higher values as regard Diabetes mellitus, hypertension in NAFLD group compared to healthy subjects.

The same result obtained by **Prashanth et al. (2009**) who showed 127 of 204 diabetic patients displayed fatty infiltration on ultrasound, and 87% of the patients with fatty infiltration who consented to biopsy had histologic confirmation of NAFLD (**Prashanth et al. (2009**).

In the current study there was statistically significant higher value as regard HBA1c in comparison between both groups that agree with **Hanetal. (2013)** who showed that serum HbA1c level was significantly correlated with NAFLD in elderly Chinese. Further clarify the precise relationship may have significant clinical implications for the diagnosis and prevention of NAFLD by monitoring HbA1c level (**Han et al. (2013)**.

Conclusion

There is strong relationship between liver function test, lipid profile and fibroscan and diagnosis of NAFLD.

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