

Nonalcoholic Fatty Liver Disease in Nonworking / Dependent class Using ultrasonography and liver function tests: As a Cost Effective Tool

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ABSTRACT

Objective: To evaluate utility of gray scale abdominal ultrasound and liver function tests in the prevalence of Nonalcoholic Fatty Liver Disease in non-working / dependent class of Faisalabad. **Study Design:** Screening study. **Setting:** Department of Radiology Allied Hospital, Faisalabad. **Duration of Study:** 6 months, from December 1 2012 to July 2013. **Sample Size:** 300. **Study Participants – Demographics.** **Material & Methods:** Patients, who denied regular alcohol drinking, were included in the study. A pre-designed study pro forma was filled with relevant parameters i.e. body mass index (BMI), ultrasound, and LFT, s, WHR, lipid profile, clinical assessments were carried out in all cases along with real-time gray scale abdominal ultrasonography as established diagnostic tool. We compared the results of LFT, s and hepatic ultrasound of suspected and non-suspected and are statistically analyzed by SPSS 12. **Results:** Out of three hundred patients, 200 (67%) female and 100 (33%)

were male suspected. Mean age of the patients was 38.93 ± 8.57 years. The prevalence of fatty liver in males younger than 35 years old was significantly higher (71.7 %) where as it markedly increased in females younger than 48 years (65.25%). Multiple factors analysis reveals that the prevalence of fatty liver was positively correlated to several risk factors, including female, age (>50yr), hyperlipidemia, impaired glucose tolerance/diabetes mellitus, hypertension and overweight/obesity. Fifty one (54%) patients with symptoms like obesity, fatigue, generalized weakness, and pain RUQ had fatty liver where as 23.2% had raised Liver enzymes, 20.0% with cholelithiasis and 16.92% with D.M. **Conclusions:** Routine hepatic ultrasonography and LFT in every suspected patient with symptoms of fatigue, generalized weakness, and pain in RUQ, is able to detect NAFLD as it is cheap and easily available facility in our country **Key words:** NASH, NAFLD, Diagnosis, Liver function test and Gray scale ultrasound.

INTRODUCTION

Fatty Liver is defined as diffused accumulation of fats mainly triglycerides in the liver cells. Usually the fat contents increase more than 5% of the normal liver weight.¹ If there is only accumulation of fats it is called steatosis and when this fat accumulation is accompanied by necro-inflammatory changes in the liver it is called steato-hepatitis.

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The term non-alcoholic fatty liver disease (NAFLD) includes spectrum of changes from steatosis alone to non-alcoholic steato-hepatitis. Fatty liver is divided mainly into two categories, like Alcoholic fatty liver and Non-alcoholic fatty liver. Non-alcoholic steatohepatitis (NASH) is the most extreme form of NAFLD, which is regarded as a major cause of cirrhosis of the liver of unknown cause.²

Major causes of fatty liver with macro vesicular fat depend on age, geographic location and metabolic nutritional status of patient population. Obesity (present in 40%), diabetes mellitus (in 20%), hypertriglyceridemia (in 20%),

corticosteroids and endocrinopathies leads to fatty liver.

Nonalcoholic fatty liver disease (NAFLD) is the most common liver disorder not only in South Asian countries, but also Fatty liver is an increasingly common problem worldwide and has been reported in Japan,³ Australia,⁴ America,⁵ Europe,⁶ and the Middle East.⁷ Recent studies indicate that fatty liver is an emerging problem in the subcontinent affecting 35-40% of the general population. A comprehensive review of available data reveals that the overall prevalence of NAFLD in the sub-continent is broadly not similar to that in western countries, affecting between 10% and 45% of community subgroups. The prevalence varies by age, gender and ethnicity, as well as with criteria used for disease definition. There is strong evidence that the prevalence of NAFLD in this region has increased substantially during the last 15 years and is likely to increase further in the future, in parallel with regional trends in over-nutrition, obesity, type 2 diabetes and the metabolic syndrome.

As shown by the study of Saadeh⁹ it cannot distinguish steatosis from steatohepatitis, nonetheless; US did show an Sensitivity of 100% it is one of the preferred screening methods because of its low cost and wide availability. Thus, if we combine Imaging Studies with LFT,s we could very probably detect patients with NASH even in early stages. On the other hand, to be able to establish a definitive diagnosis of NASH (most extreme form of NAFLD) a liver biopsy is necessary;⁸ However, the risks inherent to the procedure and the absence of symptoms in the majority of patients prevent it from being carried out regularly, for this reason we must seek alternative diagnostic methods that are less invasive and that have adequate sensitivity and specificity.

In our country due to the considerable prevalence of type 2 DM, overweight and obesity, we suppose that the percentage of patients at risk for developing NAFLD and HC is significant, and LFT as well as US can be methods that can help us detect these diseases in an opportune manner in patients that must be referred to a specialty center to be evaluated for liver biopsy and eventually, inclusion in treatment protocols. So the purpose of

our study is utility of gray scale abdominal ultrasound (US) and Liver Function Tests (LFT, s) in the early evaluation in Diagnosis of Nonalcoholic Fatty Liver Disease (NAFLD).

MATERIALS & METHODS

It was a screening study and total of 5000 patients, who took part in regular physical examination from December 1 2012 to July 2013 (in Allied Hospital, Faisalabad.) were recruited. Three hundred suspected and non-suspected patients were randomly selected from outdoor patient department. Informed verbal consent was taken from each patient and pre-designed proforma was filled in. Out of 230 suspected 200 females and 30 were males. Out of non-suspected 70, female 50 and male 20. The mean age of participants was 38.93 SD+/-8.5 years. Other hepatopathies were ruled out by using followings inclusion and exclusion criteria used.

Inclusion criteria:

- Obesity
- Diabetes mellitus type II
- Fatigue + pain in RUQ
- Generalized fatigue.

Exclusion criteria:

- Alcohol intake
- Drug use
- Viral hepatitis

Ultrasonographic examination of liver and gallbladder was performed by Experienced Sonologist, using the Famio 5 unit with 3.5MHz probe. Fatty liver was defined as the presence of an ultrasonographic pattern consistent with "bright liver", with evident ultrasonographic contrast between hepatic and renal parenchyma, vessel blurring, and narrowing of the lumen of the hepatic veins in the absence of findings suggestive of chronic liver disease [13, 14].

All patients had LFT, triglycerides, viral hepatitis panel. Two groups of patients were analyzed by number of subjects, gender, age, body mass index (BMI), prevalence and type of diabetes, obtaining in suspected and non-suspected group.

Statistical Analysis: The results from the laboratory tests and the hepatic ultrasound were compared by using SPSS Version 12.

RESULTS

Among 300 patients, 230 were in suspected while 70 were in none suspected group. Out of 230 suspected, 125 were having fatty liver (110 (84.6%) were female and 15 (11.54%) were male). Eight had fatty liver in none suspected.

Table-1 shows Frequency of fatty liver in suspected and non-suspected patients.

Table 1: Frequency of fatty liver in suspected and non-suspected patients

Fatty liver	Suspected	Non Suspected	P value
	125/140 (89.28%)	8/70 (11.4%)	0.0001

Table 2: Fatty liver distribution in suspected patients group

Age	Sex	Number	Fatty liver no (%)
<35	Male	07	5 (71.4%)
	Female	25	10 (40.0%)
	Total	32	15 (46.87%)
35-50	Male	14	09 (57.14%)
	Female	140	90 (64.2%)
	Total	154	98 (64.0%)
50-64	Male	9	2 (22.22%)
	Female	35	9 (25.71%)
	Total	44	11 (25.0%)

Table 2 Shows Age ranged from 25-60 years and mean age of the patients was 38.93 ± 8.57 years.

The prevalence of fatty liver in males younger than 35 years old was significantly higher (71.42 %) where as it markedly increased in females younger than 48 years (64.28%) than that of in males. But the difference between the sexes became less significant in people older than 48 years (25.71 % vs. 22.22 %).

The prevalence of fatty liver was maximum (64%) in age group between 35-50.

Table 3: Patient Parameters in relation to fatty and non-fatty liver in suspected group

	Fatty liver	Non fatty liver
Hepatomegaly	75	10
Obesity	75	12
Fatigue	72	07
BMI	68	07
Pain in RUQ+ heaviness in epigastrium	60	11
Generalized weakness	49	16
LFT,s	29	05
Cholelithiasis	26	14
D.M	22	05
HTN	19	07
Viral markers	13	04
Others CA pancreas, renal stone, splenomegaly	04	01

Table 3 shows the most common findings were obesity, Hepatomegaly followed by fatigue, generalized weakness, cholelithiasis and DM. whereas 23% had raised LFT, s.

Table 4: Obesity indices, LFT,s and Lipid profile Para meter in Fatty and Non Fatty liver patients

	Fatty liver	Non Fatty liver
BMI	28.1(25-34)	26.1(22-30)
ALT	57+/- 9ul	17.5+/-5 ul
AST	35+/- 14 ul	17.5+/-4.5ul
D/ID bilirubin	Normal	normal
Lipid profile		
Cholesterol (mg/dl)	188+/-56.7	159+/-20
Triglyceride (mg/dl)	125.5+/-88.2	87+/-73.2
Waist/Hip Ratio	0.86+/-0.05	0.70+/-0.04

Table.4 shows Serum billirubin were normal in all the study patients while other biochemical derangements in NAFLD patients .Average body mass index was 28.4 (range 25 to 34), 26.1 (range 22to 31) respectively in fatty and non-fatty liver. ALT with a median of 57.0 ± 9.0 U/L in patient's and 17.5 ± 5.5 in non-suspected This enzyme was elevated in 29 cases (23.7%) of suspected and four of the non-suspected. AST with averages of 35.0 ± 14.0 U/L for patients and 17.5 ± 4.5 for non-suspected, it was increased in 2 cases (1.6%) of suspected and one in controls.

DISCUSSION

The natural history of fatty liver ranges from asymptomatic indolent to end stage liver disease. Diagnosis of nonalcoholic fatty liver (NAFLD) and nonalcoholic steatohepatitis (NASH) may involve ultrasonography, liver biopsy and recognition of related condition.⁹ Fatty liver is a common disease of liver without specific clinical features and lack of confirmatory laboratory

tests.¹⁰ A biopsy (tissue examination) of the liver is the only test that is widely accepted as definitively distinguishing NASH from other forms of liver disease, and can be used to assess the severity of the inflammation and resultant fibrosis. While it could be argued that in the absence of histology this figure may not reflect the true prevalence of fatty infiltration, previous studies in which ultrasound findings were compared to histologic results indicate that the overall sensitivity and specificity of ultrasound examinations for the diagnosis of fatty liver are approximately 80-95 % and 90-95 % respectively.^{11,12} In the present study, the prevalence of NAFL was 50 % in males and 55 % in females according to ultrasonic criteria of diagnosis for fatty liver. As various studies describe NAFLD as asymptomatic which may be true in initial phase of NAFLD but patients may present with fatigue and heaviness in right upper abdomen later on. This study was limited to non-working and dependent class of Faisalabad population. In comparison with general population, participants of this study had better living condition and less physical exercises. The results of this study showed higher prevalence of hyperlipidemia and fatty liver in participants than those in general population.

In present study fatigue was noted as chief complaint 72 (82.31%) were fatty liver patients. Generlized weekness seen in 65, out of which 49 (75.7%) were having NAFLD. Heaviness right upper abdomen and pain in abdomen 60 (80.50%). Here it is difficult to say complaints were purely due to NAFLD. A study by Wing-kin syn et al described fatigue as an important symptom and pain right upper abdomen in 33% of the patients.¹³ Heaviness and pain in right upper abdomen is due to stretching of the liver capsule which is correlated with the amount of fat present in the liver.¹⁴ Diabetes mellitus is an important risk factor for NAFLD. AST and ALT were raised in our study in 29(23.72%) and 2 (1.6%) fatty liver patients respectively, however raised ALT and AST have been reported in significant number of fatty liver patients in other studies.^{15,16} Raised ALT level is important finding in fatty liver patients. while not seen in our study and support

the study by Luxmi et al.¹⁷ Normal ALT has also been reported in NAFLD by other studies.¹³ but raised in ALT seen in diabetic patients who have fatty liver.

To date little attention is put on finding liver steatosis, and although how many of these cases can evolve into NAFLD is ignored, it was already mentioned that almost half of them can transform into HC,¹⁸⁻²⁰ for this reason it is important to take into consideration populations at risk for developing NAFLD like diabetics and obese patients, and intentionally rule out this disease in early stages.

It is difficult to perform a liver biopsy in patients with possible NAFLD, in our institution we could barely make up a small sample of 300 patients, this is why we consider that using simple, accessible and low cost tests in a susceptible population can allow for the detection of cases that warrant further study and specialized treatment. It has been demonstrated recently that in diabetic patients an increase in aminotransferase levels has good correlation with underlying nonalcoholic fatty liver disease.¹⁴ Which is consistent with our observations? Ultrasound is capable of revealing the earliest changes of the disease, when there is only steatosis, and even before there is an alteration in LFT reflecting inflammation (steatohepatitis).

It is pertinent to say that we have taken abdominal ultrasonography as a tool for detection of NAFLD which can only detect if the fat content of the liver is more than 33% and sensitivity of ultrasonography for detection of fatty liver is poor if the patient has fat content less than 33% of the liver weight. This is why relying on these results we propose routinely implementing performing LFT and liver US in every diabetes control clinic, at least once a year, especially in overweight patients, to be able to detect patients that have signs of NAFLD and that must be referred to the gastroenterologist for subsequent studies.

CONCLUSION

In our opinion, routine hepatic ultrasonography and LFT in suspected patient with symptoms of fatigue, generalized weakness, and pain in RUQ is able to detect NAFLD as it is cheap and easily available facility in our country

Limitations of the study: We could not do liver biopsy due to ethical and financial constraints. Sample size was also small due to financial constraints.

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