Original Article

Non-Alcoholic Fatty Liver

Frequency of Prediabetes and its Association with Lipid Profile in Patients with Non-Alcoholic Fatty Liver Disease

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ABSTRACT

Objective: To determine the frequency of prediabetes in patients with non-alcoholic fatty liver disease and to compare the mean values of cholesterol, triglycerides, low density lipoproteins and high density lipoproteins in patients of non-alcoholic fatty liver disease with and without prediabetes.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at Medical Outpatient Department, Sharif Medical City Hospital, Lahore from 30th December 2013 to 29th June 2014.

Materials and Methods: Three hundred twenty five patients with ultrasonic diagnosis of NAFLD were included. All the patients with other causes like alcohol, viral hepatitis, toxins and drugs were excluded. All patients were screened by Glucose tolerance test (GTT) and if post GTT, blood sugar level came out greater than mg/dl, it was labeled prediabetes. Lipid profile was compared in both groups.

Results: Frequency of the pre-Diabetes is quite high in our population with nonalcoholic fatty liver disease i.e.82.2% and means values of cholesterol, triglyceride low density of lipoprotein and high density lipoprotein in patients of non-alcoholic fatty liver disease are equally distributed patients with and without pre-diabetes. These mean values are, mean value of cholesterols patients with pre-diabetes was 1.86.8±2.3 mg/dl while without pre-diabetes it was 193.4±40.8 mg/dl while mean triglyceride level in patients with pre-diabetes was 180.5±37.2 mg/dl while without pre-diabetes patients it was with 180.7±40.4 mg/dl. Similarly the mean LDL level was 157.8±19.4 mg/dl and with pre-diabetes and 156.8±19.8 mg/dl in patients of NAFLD without pre-diabetes.

Conclusion: It is concluded that frequency of prediabetes and dyslipidemia is quite high so we should screen all patients of NAFLD for glucose intolerance.

Key Words: Diabetes, Prediabetes, Glucose tolerance test, Nonalcoholic fatty liver disease

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INTRODUCTION

Nonalcoholic fatty liver disease (NAFLD) is a disease of modern era ranging from simple fatty liver to nonalcoholic steatohepatitis and cirrhosis. [1] It is closely associated with obesity, dyslipidemia, diabetes and atherosclerosis.[2] Current epidemic in Western countries have involved 20 to 30% of adults in the general population and is the most common cause of chronic liver disease.[3] The prevalence of NAFLD in general population of Pakistan is 18%.[4] Patients with NAFLD are at a high risk of atherosclerosis regardless of metabolic syndrome and classical cardiovascular risk factors.[5]

In a study to determine the prevalence and the metabolic impact of prediabetes and type 2 diabetes mellitus in 118 patients with NAFLD, prediabetes was present in 70.3% NAFLD patients.[6] In an Egyptian study to assess whether type 2 diabetes mellitus-induced hyperglycemia has an effect on the lipid profile in patients with nonalcoholic fatty liver 105 patients, matched in age and weight, were classified into two groups: the first group consisted of patients with NAFLD and the second group consisted of patients with NAFLD in conjunction with hyperglycemia due to the presence of type 2 diabetes mellitus. The outcome levels in first and second group respectively are Cholesterol (mg/dl) 209.4±12.8 and 221.7±19.6, Triglycerides (mg/dl) 174.4±10.1 and 206.7±13.3, LDL-C (mg/dl) 144.3±9.7 and 175.7±7.6, HDL-C (mg/dl) 29.7±2.7 and 21.4±2.1. All the differences were significant except for cholesterol levels.[7,8]

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MATERIALS AND METHODS

This cross sectional study comprised 325 patients conducted at Medical Outpatient Department, Sharif Medical City Hospital, Lahore over a period of Six months from 30th December 2013 to 29th June 2014. Both male and female, with age from 30-60 years and

non-alcoholic fatty liver disease determined by ultrasonography were included. History of cerebrovascular accidents, transient ischemic attack, peripheral vascular disease, connective tissue disorders, vitamin D deficiency, congenital fat storage diseases and ischemic heart disease and acute or autoimmune hepatitis were excluded. After consent, 75 gram glucose tolerance test was performed on all participants. On basis of diabetes screening the participants were divided into two groups i.e. one with prediabetes (blood glucose level from 140 to 199 mg/dl) and other with no diabetes (blood sugar level less than 140mg/dl). Included patients were called next day with a 12-h overnight fast. Sampling for lipid profile was done by a trained nurse under aseptic conditions. The groups were compared regarding lipid profile in terms of serum cholesterol levels, high and low density lipoprotein, triglycerides. All the collected data was entered into SPSS version 19 and analyzed. Independent t-test was used for determination of significant difference. P ≤0.05 was considered as statistically significant.

RESULTS

There were 171 (52.6%) males and 154 (45.4%) were females with mean of the patients was 42.2±9.1 years ranging from 28-60 years. Out of 320 patients pre-diabetes was present in 267 patients (82.2%) while 58 individuals (17.8%) were not having pre-diabetes (Table 1). Mean high density lipoprotein was equally distributed among patients with and without pre-Diabetes in included patients. Similar was the case with cholesterol (p value =0.1). Similarly mean serum cholesterol was similar among patients with pre-Diabetes and without pre-Diabetes (p value =0.245). Triglyceride distribution was similar among included patients either they had pre-Diabetes or don't have pre-Diabetes (p value =0.197). Mean Low density lipoprotein were equally distributed with and without pre-diabetes (p value =0.707) [Table 2).

Table No.1: Demographic information of the patients

Variable	No.	%age
Age (years)		
< 40	135	
> 40	190	
Gender		
Male	171	52.6
Female	154	45.4
Prediabetes		
Yes	267	85.2
No	58	17.8

Table No.2: Comparison biochemical parameters with prediabetes in NAFLD

Parameter	Yes	No	P value
High density lipoprotein	24.62± 4.539	25.71±4.619	0.10 (NS)
Cholesterol	186.85± 38.849	193.47±40.803	0.245 (NS)
Triglycerides	180.50± 37.295	187.59±40.411	0.197 (NS)
Low Density Lipoprotein	157.89± 19.427	156.83±19.809	0.707 (NS)

DISCUSSION

Non-alcoholic fatty liver disease (NAFLD) is an increasingly recognized clinicopathological condition that may progress to end-stage liver disease. The pathological picture resembles alcohol-induced liver injury, but occurs in patients who deny alcohol abuse. Non-alcoholic fatty liver disease comprises a wide spectrum of liver damage ranging from simple, uncomplicated steatosis to steatohepatitis to advanced fibrosis and cirrhosis.[9]

In non-alcoholic fatty liver disease has variation in distribution in pre-diabetes from different ethics groups as we have extensively reviewed literature. In our sampled population its frequency was 267 out of 325 included patients i.e. (82.2%) which is quite high. It shows that prevalence of pre-diabetes in NAFLD is too high that every person coming with this diagnosis should be screened while oral glucose tolerance test to determine whether he / she is pre-diabetes or not.

This high prevalence of pre-Diabetes indicates that liver and its pathologies plays a major role in development of disease. Once the life style changes and other modification take into an account it not only reduces the incidences of pre-Diabetes which further converted into diabetes and add on the food of the diabetic patients but also reduced the morbidity associated with NAFLD. High prevalence of pre-Diabetes in our sampled population also sensitized the clinician to be vigilant about the presence of co-existing metabolic syndromes in patients with non-alcoholic fatty liver disease.[10,11]

In our sampled population the male and female ratio was almost equal 47.4% were female and 52.6% were male. The mean age of presentation of NAFLD disease was 40 years and beyond 40. We have a mean value of 42.26 years with ranging from 28 years to 60 years. Twenty eight years patients are quite young, healthy and should be physically active but the result shows that the inactivity and changing life style and dietary behaviors have let to development of non-alcoholic fatty liver disease. One of the most important finding which we want to discuss is the abnormality of the lipids in these NAFLD patients to our surprise we found all patients had high density lipoprotein all

patients had abnormal HDL level and low density lipoprotein levels both shows lack of activity and increase intake of saturated fatty acids this is alarming situation.

The presence of metabolic syndrome and pre-diabetes in both groups is independent of age and sex it means it is simply the presence of NAFLD which makes a person prom to pre-diabetes and it effects the lipid profile in a negative way without presence of pre-diabetes does not affect the lipid markers. HDL, LDL, cholesterols triglyceride all were equally distributed among patients with and without pre-Diabetes .Abnormal lipid-profile in FALD patients also determine that they should be a preventive program to increase the physical activity and reduction in consumption of fats in our diets and change life style behavior shifted to individual is essential in the current situation.[12,13]

CONCLUSION

The frequency of the pre-diabetes is quite high with nonalcoholic fatty liver disease (82.2%) and means values of cholesterol, triglyceride low density of lipoprotein and high density lipoprotein in patients of non-alcoholic fatty liver disease are equally distributed patients with and without pre-diabetes.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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