TO STUDY THE PREVALENCE OF NON ALCOHOLIC FATTY LIVER DISEASE AND ITS CORRELATION WITH METABOLIC SYNDROME

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ABSTRACT: AIMS: To study the prevalence of non-alcoholic fatty liver disease (NAFLD) in patients presenting for routine health check-up and To establish the relationship between NAFLD and various component of metabolic synbrome.**PATIENTS AND METHODS**: 500patients attending the medical OPD for health check-up had their blood pressure, height and weight, waist and hip circumference measurements, waist-hip ratio, blood sugars, lipid levels and ultrasound abdomen done after applying exclusion criterias.Those with normal ultrasound abdomen weretaken as control and those with NAFLD were taken as cases. The prevalence of NAFLD among these subjects was determined and the presence of risk factors for metabolic disease in each individual was analysed. A relationship between NAFLD and metabolic syndrome was then established.**RESULTS**: Of the 500people 198 (39.6%) had NAFLD.The prevalence is higher among females 127/282 (45%) than males 71/218 (32.6%).In the NAFLD group normal body mass index (BMI) was present in only 50/198 (25.3%) of the subjects while 89/198 (44.95%) were overweight and 59/198 (29.8%) were obese. Whereas in control group normal BMI was present in 199/302 (65.9%), overweight were 86/302 (28.5%) and only 17/198 (5.6%) were obese.Prevalence of metabolic syndrome was 137/198 (69.2%) among cases and 95/302 (31.5%) among controls.**CONCLUSION**: A diagnosis of fatty liver on ultrasound in an asymptomatic person should alert us of metabolic syndrome and its progression to cardiovascular disease. NAFLD may be considered as the hepatic component of metabolic syndrome.

KEY WORDS: Non-alcoholic fatty liver disease (NAFLD), Metabolic syndrome, Diabetes mellitus.

INTRODUCTION: The term "non-alcoholic fatty liver" was first used in 1980, to describe a clinico pathologic syndrome that occurred in obese, diabetic females who denied alcohol use, but in whom the hepatic histology was consistent with alcoholic hepatitis[1]. It is a spectrum of liver diseases ranging from hepatosteatosis (fatty liver), to non-alcoholic steatohepatitis (NASH) (fat with inflammation), through to fibrosis and potentially cirrhosis and hepatocellular carcinoma without a history of immoderate alcohol use.[2-4] The maximum allowable level of alcohol intake for definition of NAFLD is 2 standard drinks a day (140 g ethanol/week) for men, and one standard drink a day (70 g ethanol/week) for women.[5] The prevalence of NAFLD is 15 to 40% in western countries and 9-40% in Asian countries.[5]Though there are many invasive and non-invasive methods of detecting NAFLD, the most frequent and readily available method to measure hepatic steatosis is by ultrasonography, by which patients with more than 30% liver fat can be diagnosed accurately.[6]

Haller and colleagues used the term "metabolic syndrome." Studies in Asia, suggest its prevalence of 5-20%, with an overall global prevalence of around 16% of the adult population.[7,8] Prevalence in India appears to be highest, at around 26% of the adult urban population.[9,10]

The relationship between NAFLD and the metabolic syndrome is becoming increasingly recognized. Approximately 90% of patients with NAFLD have ≥ 1 characteristic feature of metabolic syndrome and about 33% have the complete diagnosis[11], placing NAFLD as the hepatic representation of the metabolic syndrome.[12,13] The metabolic syndrome predicts higher risk of NAFLD in men and women, independent of weight gain[14], and those individuals with the metabolic syndrome are less likely to experience regression of NAFLD.[15]

Hence this study was conducted with the aim of determining the prevalence of NAFLD in the apparently healthy punjabi population and establishing a correlation between NAFLD and metabolic syndrome.

MATERIAL AND METHOD: A total of 500 punjabi patients between 20 to 70 years of age who attended the OPD/indoor of SGRDIMSR for routine health checkupformed the study group. This was an ultrasound-based study. Sonologically fatty liver was diagnosed as diffuse increase in parenchymal echogenicity with progressive loss of clarity of portal veins and increased attenuation of sound by the liver.[12]After taking relevant history and consent of the patient, abdominal ultrasonography (USG) was done as a screening tool to diagnose NAFLD.

Patients proved to have fatty liver on abdominal ultrasound wereconsidered as NAFLD group and the remaining subjects with normal ultrasound served as controls. Detailed history was taken in all the cases and controls, and anthropometric, clinical and biochemical assessments were carried out in all the subjects.

Following patients excluded from the present study:

1. Those with history ofAlcohol intake >20gm/day
2. Those on current use of medication affecting liver functions.
3. Participants tested positive for HBsAg or AntiHCV.
4. Previous history of known liver disease including viral, genetic, auto-immune and drug induced liver disease

Metabolic syndrome was defined by using the ATPIII (The modified criteria of National Cholesterol Education Program, Adult Treatment Panel lII (NCEP, ATP lll) proposal. Identification of the presence of any three of the five risk factors determines metabolic syndrome.[16]

Risk factor Defining level:

1.Abdominal obesity (waist circumference)
Men > 102 cms
Women > 88 cms
2.Triglycerides 2 150 mg/dl
3.High density lipoprotein (HDL) Cholesterol
Men < 40mg/dl
Women < 50mg
4. Blood pressure ≥130/85mm of Hg
5. Fasting blood glucose □ 100mg/dl

Anthropometric measurementsincludedthe measurement of - Height (mts), Weight (kg),BMI (kg/m2), Waist circumference (cm), Hip circumference (cm) and Waist hip ratio. Normal weight was defined as BMI from 18.5 – 24.9, overweight from 25 – 29.9 and obesity ≥ 30.

RESULTS: Out of 500 subjects, the present study consisted of 282 (56.4%) females and 218 males (43.6%). 198 of the 500 subjectshad USG evidence of fatty liver. Thus the prevalence of NAFLD was 39.6% (n=198/500)in our study. The prevalence among the females (45%) was found to be higher than in males (32.6%). The mean age in NAFLD group was higher (54.00 ± 11.61) than in controls (47.41 ± 15.59). The maximum number of patients were in the age group of 51-60 (n=134).

We observed that 69.7% subjects having NAFLD belonged to rural area and 30.3% were from urban area. The distribution is almost similar in the control group with 72.2% from rural area and 27.8% from urban area (p=0.548)

Number of patients with metabolic syndrome were found to be nearly double in NAFLD group (69.2%) as compared to controls (31.5%)[p<0.001]. It was observed that there were higher number of diabetics in NAFLD group (36.9%) as compared to controls (20.5%) [p<0.001].

In the NAFLD group it was observed that 50 (25.3%) subjects were having normal BMI, 89 (44.95%) were overweightand 59 (29.8%) were obese whereas in control group 199 (49.8) were with normal BMI, while 86 (28.5%) were overweight and 17 (5.6%) were obese. (p<0.001)

Hypertriglyceridemia was present in the NAFLD group with mean of 176.45 ± 77.91 and among controls it was 138.59 ± 54.51 (p<0.001). The HDL level was low for cases with mean of 38.91 ± 8.86 and 41.57 ± 9.30 for controls (p=0.002). The FBS was elevated with cases having112.91 ± 39.49 and controls with 98.92 ± 35.67 (p<0.001)

The mean systolic blood pressure in cases was 131.93 ± 15.95and in controls it was 125.57 ± 15.50 (p<0.001). Mean diastolic blood pressure was also found to be higher in NAFLD group (84.55 ± 8.21) as compared to control (81.21 ± 8.49) [p<0.001].

The BMI was higher in NAFLD group, mean of 28.49± 6.42 kg/$m^2$and among controls it was 23.68 ± 3.59. Other anthropometric parameters were also found to be higher in NAFLD group compared to controls. The mean waistcircumference in NAFLD group was100.49 ± 10.23 cm and 89.16 ± 11.17 cm in controls (p<0.001) and the hip circumference was102.26 ± 13.08 and 92.67 ± 8.94 in the respective groups (p<0.001). The waist hip ratio was higher for NAFLD group with mean of 0.987 ±.072 and 0.962 ±.079 for controls (p<0.001)

In NAFLD group the mean serum SGOT was 30.87 ± 19.38 and among controls 28.19 ± 12.91 (p=0.421). Mean serum SGPT was32.84 ± 21.46 in NAFLD group and 29.94 ± 13.59 among controls (p=0.956). They were found to be statistically insignificant.

Not even a single risk factor of metabolic syndrome was present in 2/198 (1%) of cases and 45/302 (14.9%) of controls, while one risk factor was present in 18/198 (9.1%) of cases and 74/302 (24.5%) of controls. The presence of two risk factors was seen in 41/198 (20.7%) NAFLD group and 88/302 (29.1%) controls. Three risk factors were present in 56/198 (28.3%) of NAFLD group and 53/302 (16.6%) of controls. Four risk factors were noted in 64/198 (32.3%) and 32/302 (10.7%) of cases and controls respectively. All the components of metabolic syndrome were present in 17/198 (8.6%) of cases and 10/302 (3.3%) of controls. Thus, the cases having≥3 components of MetSwere found to be associated with NAFLD.

DISCUSSION: In India, the prevalence of NAFLD in the general population varies from 10% to 30%, the lowest figures being from rural areas of West Bengal[17] and the highest from urban population of Chennai.[18] The present USG based study showed a prevalence of 39.6%, and is comparable with thestudy performed by Xiaona Hu et al in Shanghai, china which reported a similarprevalence of NAFLD (38.17%).[19] On assessing the severity of NAFLD by ultrasonography, it was found that 50.2% of the patients were in grade II severity and this observation was comparable to the study by WhyeLian et al.[20]

A positive correlation was observed between the prevalence of NAFLD and the increasing age of the patients ($p<0.001$).The peak prevalence noted was in the age group of 50-70 years. Xiaona Hu et al, also reported a peak prevalence of NAFLDbetween 50-65 of age.[19]

The prevalence of NAFLD was observed to be higher among females (45%) as compared to males (32.6%) in the present study. Ludwig J et al, Lee RG et al and Powell et al had suggested that NAFLD was more common in women in their respective studies. [1, 21, 22]

Among the NAFLD group, 64.1% were females and 35.9% were males ($p=0.005$) and in the control group 51.3% werefemale and 48.7%weremale patients, was comparable with study done by Dassanayake AS et and Mark Anthony et al.[23,24]in contrast to this, SP Singh et alreported that the prevalence of NAFLD was more common in males (26.9%) than in females (13.8%).[25] The high prevalence among females in our study could be explained by large sample size of female participants in our study group, and also due to high consumption of alcohol among males which is one of our exclusion criteria, a relatively larger number of males were excluded.

In the present study there is a strong association between NAFLD and metabolic syndrome with its prevalence being double in the NAFLD group (69.2%) as compared to the controls (30.8%).It was also observed that there were a higher number of patients with ≥3 components of metabolic syndrome in NAFLD group than the controls ($p<0.001$) and maximum number of patients were those having four components of MS.

The mean systolic and diastolic blood pressure was found to be higher in cases in the present study and was consistent with the finding from the study done by Bedgoniet al.[26]

Higher values of waist circumference, mean BMI, mean serum triglycerides, mean serum HDL, mean serum FBS were observed among NAFLD group in the present studyand these results were comparable with the study by DeepaUchil et al and S.bajaj et al.[27,28]

International Diabetic Federation states that once the diagnosis of metabolic syndrome is made the future management of the condition should be aggressive and uncompromising and the aim is to reduce the risk of type II diabetes mellitus and coronary vascular disease.

CONCLUSION: In summary USG evidence of fatty liver should be takenas a predictor of metabolic syndrome. It is atherogenic and predisposes to diabetes, hypertension, dyslipidemia and has a strong potential for coronary vascular disease. Prevention is better than cure. Hence a diagnosis of NAFLD on ultrasound in an asymptomatic patient should alert us of the preventable metabolic syndrome and its progression to coronary vascular disease, Thus making it necessary to take the same precautions as for any other predictors of metabolic syndrome.

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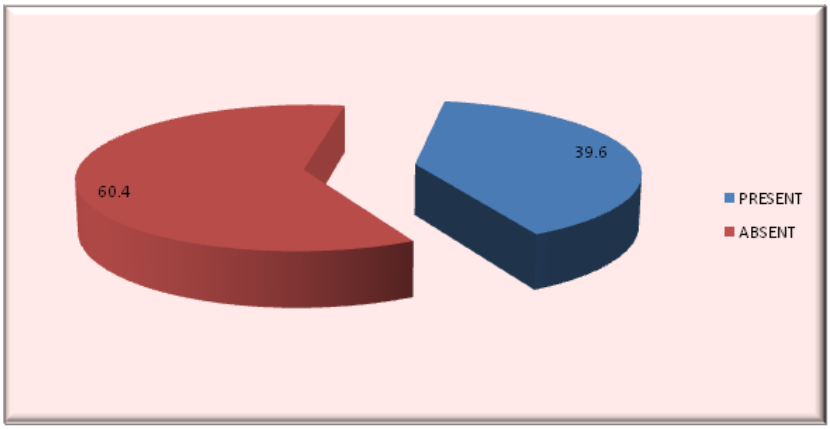
P value parameters	(Mean ±SD) NAFLD group (N=198)	Control group (N=302)	P value
Age	54.00 ± 11.61	47.41 ± 15.59	<0.001
Systolic blood pressure	131.93 ± 15.95	125.57 ± 15.50	<0.001
Diastolic blood pressure	84.55 ± 8.21	81.21 ± 8.49	<0.001
Waist Circumferance	100.49 ± 10.23	89.16 ± 11.17	<0.001
Hip circumference	102.26 ± 13.08	92.67 ± 8.94	<0.001
Waist hip ratio	0.987 ± .072	0.962 ± .079	<0.001
BMI	28.49± 6.42	23.68 ± 3.59	<0.001
Serum FBS	112.91 ± 39.49	98.92 ± 35.67	<0.001
Serum triglyceride	176.45 ± 77.91	138.59 ± 54.51	<0.001
Serum HDL	38.91 ± 8.86	41.57 ± 9.30	=0.002
Serum SGOT	30.87 ± 19.38	28.19 ± 12.91	=0.421
Serum SGPT	32.84 ± 21.46	29.94 ± 13.59	=0.956

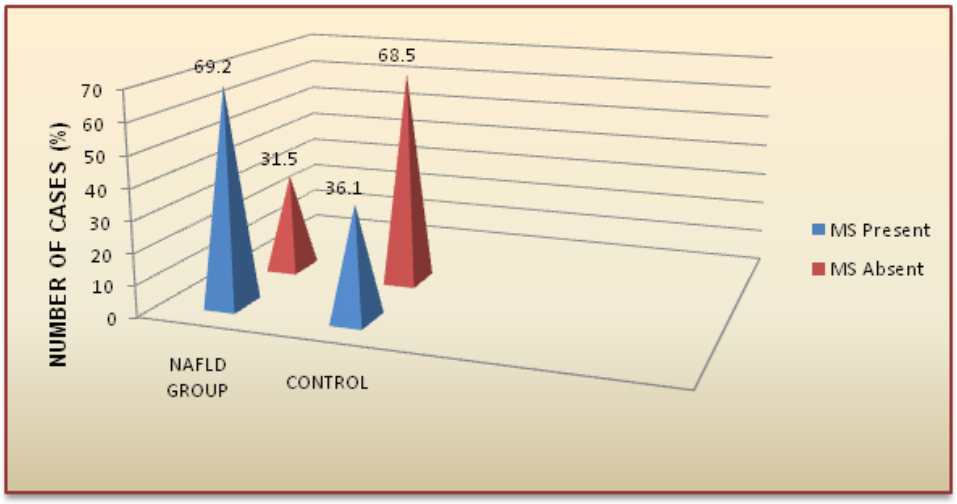
Table 1: Comparison of physical, biochemical and anthropometric values between the NAFLD group and controls

Number of components	NAFLD group (n=198)	Control group (n=302)	P value
0	2(1%)	45(14.9%)	<0.001
1	18(9.1%)	74(24.5%)	<0.001
2	41(20.7%)	88(29.1%)	<0.001
3	56(28.3%)	53(17.5%)	<0.001
4	64(32.3%)	32(10.7%)	<0.001
5	17(8.6%)	10(3.3%)	<0.001

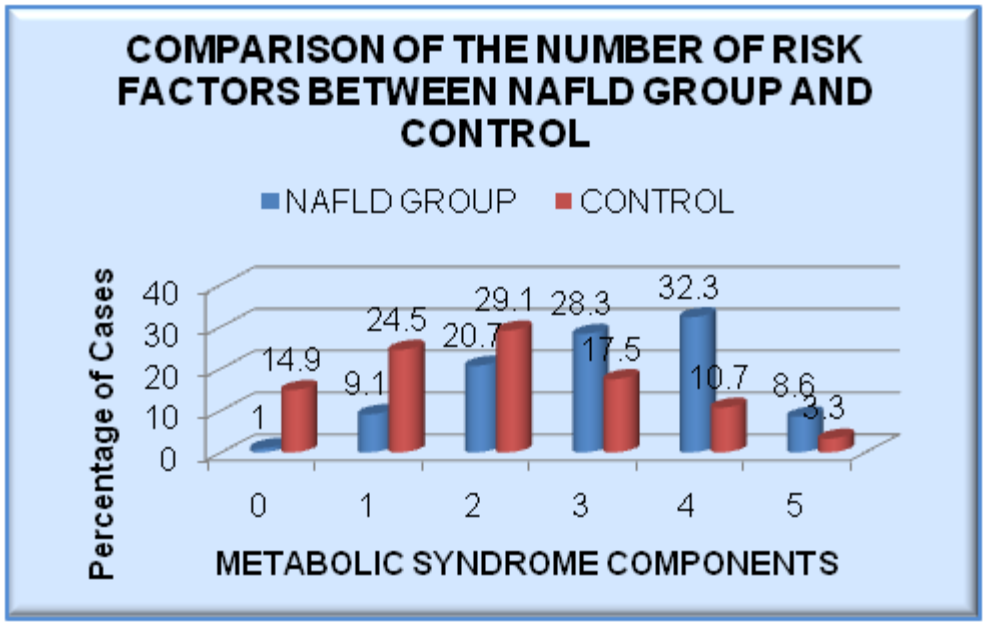
Table 2: Comparison of the number of metabolic syndrome components between NAFLD group and control group



GRAPH 1 SHOWING THE PREVALENCE OF NON ALCOHOLIC FATTY LIVER DISEASE IN PRESENT STUDY

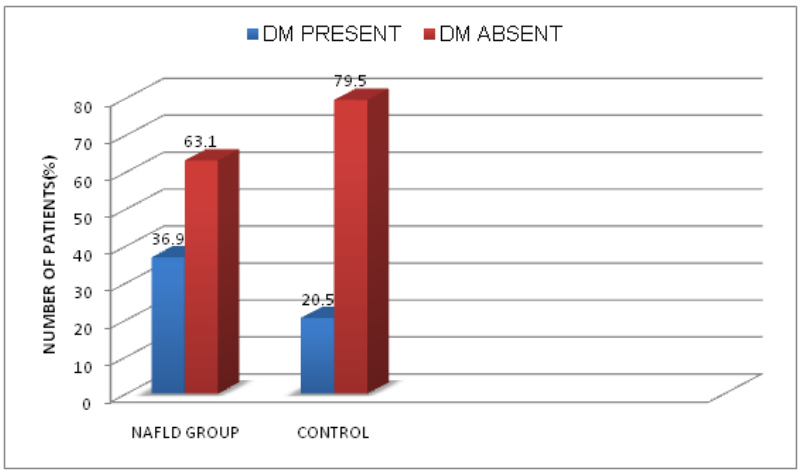


GRAPH 2 SHOWING THE PREVALENCE OF METABOLIC SYNDROME IN NAFLD GROUP AND CONTROLS



GRAPH 3 SHOWING COMPARISON OF THE NUMBER OF RISK FACTORS BETWEEN NAFLD GROUP AND CONTROLS

(NAFLD – Non alcoholic fatty liver disease)



GRAPH 4 SHOWING THE PREVALENCE OF DIABETES MELLITUS IN CASES AND CONTROLS

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