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General Medicine

STUDY OF CLINICAL PROFILE OF PATIENTS OF NON ALCOHOLIC FATTY LIVER DISEASE AND ITS ASSOCIATION WITH METABOLIC SYNDROME

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ABSTRACT **BACKGROUND:** Non-alcoholic fatty liver disease (NAFLD) is one of the most common liver problems in the western world. It is known to be associated with various metabolic abnormalities, but not much information regarding association between the metabolic disease and the severity of fatty liver is available. We conducted a study on 100 consecutive patients aged >18 years attending the outpatient and inpatient Department of General Medicine, Rajarajeswari Medical College and Hospital according to the inclusion and exclusion criteria. The study was an observational and analytical study of patients diagnosed as NAFLD. All patients diagnosed as NAFLD were investigated for metabolic syndrome according to the NCEP ATP III criteria and a relationship between NAFLD and metabolic syndrome was studied. We found that 53% of the patients of NAFLD had metabolic syndrome and statistical significance was found in waist circumference, blood pressure, triglycerides, and fasting glucose. **CONCLUSION:** Its early detection will help in modifying the disease course, delaying complications and will also play a major role in preventive cardiology. It has been observed that there is high prevalence of all the components of metabolic syndrome in cases of NAFLD.

KEYWORDS : NAFLD, Metabolic Syndrome

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD), encompasses the entire spectrum of fatty liver disease in individuals without significant alcohol consumption, ranging from fatty liver to steato-hepatitis and cirrhosis.

NAFLD is now considered to be the commonest liver problem in the western world affecting 15-40% of the general population.[1] Non-alcoholic fatty liver disease is increasingly being recognized as a major cause of liver-related morbidity and mortality.[2]

Because of its potential to progress to cirrhosis and liver failure, interest in this disease is increasing among researchers and clinicians in the relevant basic and clinical science fields.

The pathologic picture of non-alcoholic fatty liver disease, ranging from simple steatosis to steatohepatitis, advanced fibrosis, and cirrhosis, resembles that of alcohol induced liver disease.[3]

Non alcoholic steato-hepatitis that is characterized by hepatic steatosis, liver cell injury, hepatic inflammation, fibrosis, and necrosis is believed to be an intermediate stage of non-alcoholic fatty liver disease.[2]

It has been suggested that fatty liver disease can be considered as the hepatic consequence or component of metabolic syndrome or a cluster of metabolic disorders. This disease is often associated with obesity, type 2 diabetes mellitus, dyslipidemia, and hypertension. Each of these abnormalities carries a cardiovascular disease risk and together they are often categorized as the insulin resistance syndrome or the metabolic syndrome.[4-9]

The frequent association of non-alcoholic fatty liver disease with individual components of the metabolic syndrome is now well known. However, it is unknown whether the risk for this disease is increased in patients with the metabolic syndrome. This is important because the metabolic syndrome is an emerging problem worldwide and its prevalence is likely increasing.

This work was designed to study the clinical profile of patients of NAFLD with varying degrees of severity as diagnosed by ultrasonography to evaluate the relation between the non-alcoholic fatty liver disease and the metabolic syndrome along with its individual components, as defined by the modified NCEP ATP III criteria.

METHODOLOGY

All the patients suspected for non-alcoholic fatty liver disease are thoroughly examined with detail history of right hypochondriac abdomen pain, fatigue, diabetes mellitus, hypertension, alcoholism and drug history. Patients' height, weight, waist circumference, blood pressure was recorded, and body mass index, calculated. Clinical examination and laboratory investigations including ultrasonography of the abdomen was done and their association with metabolic syndrome was determined.

- Metabolic syndrome was diagnosed as per NCEP ATP III criteria criteria (three or more of the following)
- Elevated waist circumference (Asian Indian criteria)
- Men — Equal to or greater than 90 cm
- Women — Equal to or greater than 80 cm
- Elevated triglycerides: Equal to or greater than 150 mg/dL
- Reduced HDL cholesterol
- Men — Less than 40 mg/dL
- Women — Less than 50 mg/dL.
- Elevated blood pressure: Equal to or greater than 130/85 mm Hg or use of medication for hypertension
- Elevated fasting glucose: Equal to or greater than 100 mg/dL (5.6 mmol/L) or use of medication for hyperglycemia.

Statistical Methods: Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Student t test has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters.

Significant figures

+ Suggestive significance (P value: 0.05<P<0.10)

* Moderately significant (P value:0.01<P≤ 0.05)
** Strongly significant (P value: P≤0.01)

Statistical software: The Statistical software namely SPSS 16.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Ethical Clearance: Ethical clearance has been obtained from —Ethical clearance committee of the institution.

RESULTS

A total of 100 cases of NAFLD, who met the inclusion and exclusion criteria were studied.

Study design: Observational clinical study

Table 1: Waist circumference distribution of patients studied

Waist Circumference	No. of patients	%
<90	40	40.0
90-110	39	39.0
>110	21	21.0
Total	100	100.0

We observed that out of 100 cases with NAFLD, 39% of cases had waist circumference between 90 to 100 cms and 21% had waist circumference >100 cms.

Table 2: Blood pressure distribution of patients studied

Blood pressure	No. of patients (n=100)	%
SBP (mg/dl)		
<120	25	25.0
120-140	48	48.0
>140	27	27.0
DBP (mm Hg)		
<80	37	37.0
80-100	59	59.0
>100	4	4.0

Out of 100 the patients, 48% were found to have pre hypertension with SBP of 120 to 140 mmHg and 27% them were hypertensive with SBP> 140 mm/Hg. 59% of the patients were found to have a DBP between 80 to 100 mmHg.

Table 3: FBS (mg/dl) distribution of patients studied

FBS (mg/dl)	No. of patients	%
<100	48	48.0
100-126	14	14.0
>126	38	38.0
Total	100	100.0

Out of 100 patients, 14% had impaired fasting sugars (100-126mg/dl) and 38% had diabetes mellitus.

Table 4: TGL and HDL distribution of patients studied

Lipid Profile	No. of patients (n=100)	%
TGL (mg/dl)		
<150	41	41.0
150-500	57	57.0
>500	2	2.0
HDL (mg/dl)		
<35	31	31.0
35-60	67	67.0
>60	2	2.0

We observed that 57% of cases had TGL equal to or greater than 150 mg/dL. 31% of the cases had a HDL of <35 mg/dl and 67% had a HDL between 35-60mg/dl.

Table 5: Incidence of Metabolic Syndrome distribution of patients studied

Metabolic Syndrome	No. of patients	%
NAFLD without metabolic syndrome	47	47.0
NAFLD with metabolic syndrome	53	53.0
Total	100	100.0

It was evidently obtained that, among 100 cases with NAFLD, 53% of cases were fulfilling the criteria for metabolic syndrome.

Table 6: Comparison of waist circumference, SBP, DBP, FBS, AST, ALT, TGL and HDL in relation to incidence of Metabolic Syndrome of patients studied.

Variables	Metabolic Syndrome		Total	P Value
	NAFLD without metabolic syndrome	NAFLD with metabolic syndrome		
Waist Circumference	92.85±12.13	99.91±12.79	96.59±12.92	0.006**
SBP (mm Hg)	124.38±16.29	140.09±20.16	132.71±19.97	<0.001**
DBP (mm Hg)	77.87±8.83	87.36±11.03	82.90±11.08	<0.001**
FBS (mg/dl)	97.13±24.98	155.87±66.87	128.26±59.22	<0.001**
AST (IU/L)	28.68±18.78	25.08±11.12	26.77±15.23	0.239
ALT (IU/L)	36.38±34.61	29.19±15.21	32.57±26.29	0.173
TGL (mg/dl)	131.38±44.88	209.15±90.13	172.60±82.00	<0.001**
HDL (mg/dl)	42.51±7.69	42.77±46.62	42.65±34.19	0.970

In our study we observed that 99.91±12.79 was the mean waist circumference which is higher in cases of NAFLD with metabolic syndrome (statistically significant with a p value of <0.006) when compared to 92.85±12.13 without metabolic syndrome. 140.09±20.16 was the mean SBP in cases of NAFLD with metabolic syndrome (is statistically significant with a p value of <0.001) when compared to 124.38±16.29 without metabolic syndrome. 87.36±11.03 was the mean DBP in cases of NAFLD with metabolic syndrome (statistically significant with a p value of <0.001) when compared to 77.87±8.83 without metabolic syndrome. FBS was high (155.87±66.87) in cases of NAFLD with metabolic syndrome when compared to NAFLD without metabolic syndrome where mean FBS was 97.13±24.98. TGL was higher (209.15±90.13) in cases with metabolic syndrome (statistically significant with a p value of <0.001) when compared to 131.38±44.88 in cases without metabolic syndrome and mean HDL was 42.77±46.62 in cases with metabolic syndrome when compared to 42.51±7.69 in cases without metabolic syndrome.

DISCUSSION

We conducted this study on 100 cases of NAFLD diagnosed by ultrasound. NAFLD is known to be associated with various metabolic abnormalities including central obesity, type 2 diabetes mellitus, dyslipidemia and hypertension which are all well-established cardiovascular risk factors. Ultrasound is frequently used to assess fatty infiltration of the liver, but there is little information on the association between the metabolic disease and the severity of fatty liver (as detected by ultrasound). Out of the 100 cases, 53% had metabolic syndrome according to the NCEP ATP III modified criteria using Asian Indian standards for waist circumference. Similar such studies showed results as follows: Rakesh Gaharwar et al (51.4%), Ajay Duseja et al (50%), Deepa Uchil et al (47.1%) and Radu et al (61.09 %).[9,10,12,13.]

The mean age group of those having metabolic syndrome was 42.01±12.48 which is similar to those studies done by Bajaj et al (40.11 ± 1.1) and Rakesh Gaharwar et al (49.67±9.30).[11,12.]

We have observed NAFLD with metabolic syndrome was more prevalent in the age group of 30-40 years which was a younger age group as compared to US population. This implicates that Asian Indian population develops NAFLD at an earlier age.[14]

In our study, out of the 53 patients, 30 (56.60%) were females and 23 (43.39%) were males. 67% were females in a study conducted by Ajay Duseja et al and 61.1% were females and 38.9% males in a study conducted by Rakesh et al which shows females have a higher prevalence for metabolic syndrome.[10,13.]

Out of 53 patients with NAFLD with metabolic syndrome, 50

(94.33%) patients had increased waist circumference (male > 90 cms, female > 80 cms) with a mean of 99.91±12.79 cms and this observation was statistically significant. 58.7%, 47.1% and 77.77% of cases had increased waist circumference as reported by Bajaj et al, Ajay Duseja et al and Rakesh Gaharwar et al respectively.[11,9,12.]

Increased waist circumference and adiposity is strongly linked with metabolic syndrome. An increase of 1 cm of waist circumference increases the risk of metabolic syndrome by around 7.4%.[15]

In our study, 30 (56.60%) patients had blood pressure ≥ 130/85 mm Hg with a mean of 140.09±20.16/87.36±11.03 Hg which is higher compared to that reported by Bajaj et al (48.72%) and Rakesh et al (47.2%).[11,12.]

Fasting plasma glucose of patients with NAFLD and metabolic syndrome was 155.87±66.87 mg/dl. 41(77.35%) cases had impaired fasting glucose (>100 mg/dl) and was found to be statistically significant when compared to NAFLD without metabolic syndrome. 72.4% and 63.8% patients had impaired fasting glucose as reported by Ajay et al and Rakesh et al respectively.[10,12] Both peripheral and hepatic insulin resistance is present with patients with NAFLD, irrespective of the coexistence of impaired glucose tolerance and obesity.

We also observed that AST and ALT in NAFLD patients with and without metabolic syndrome were in the normal mean range for most of the patients as similar to the study done by Ajay et al and Uchil et al, however in the study done by Rakesh et al deranged AST and ALT was observed in greater percentages in patients of NAFLD with metabolic syndrome than those without metabolic syndrome.[9,10,12]

In patients of NAFLD with metabolic syndrome 45 (84.90%) had hypertriglyceridemia (>150 mg/dl) with a mean of 209.15±90.13 which is similar to the study done by Rakesh Gaharwar et al (86.1%) and is significantly higher than those reported by Deepa Uchil et al (43.6%).[13,11] 45 (84.90%) patients had low HDL levels (< 40 mg/dl in males and <50 mg/dl in females) with a mean of 42.77±46.62 mg/dl as compared to 66.7% described by Bajaj et al and 94.4% described by Rakesh Gaharwar et al.[11,12] Dyslipidemia between the two groups i.e., NAFLD with and without metabolic syndrome was significant both for prevalence as well as the respective means.

CONCLUSION

Despite the limitations, this is an attempt to characterize and define the profile of NAFLD patients who are commonly encountered in day-to-day practice. Our findings have important clinical and public health implications.

Our study reveals that there is high prevalence of all the components of metabolic syndrome in cases of NAFLD. Therefore, whenever these parameters are encountered in the clinical setting, patients must be evaluated for the presence of NAFLD by abdominal ultrasonography. The incidence of impairment of various parameters in cases of NAFLD with metabolic syndrome is higher when compared with those without metabolic syndrome.

Therefore, a conclusion can be drawn that there is a greater association of metabolic syndrome with increasing severity of fatty liver disease. Early detection would help in modifying the disease course through simple interventions like lifestyle changes, and hence delaying its complications to reduced morbidity and mortality. It would also play a major role in preventive cardiology as its association with metabolic syndrome is frequent and its components are well documented cardiovascular risk factors.

REFERENCES

1. Farrell GC, Larter CZ. Nonalcoholic Fatty Liver Disease: from Steatosis to cirrhosis. Hepatology 2006;43:S00-S112.
2. Angulo P. Nonalcoholic fatty liver disease. N Engl J Med 2002;346:1221-31.
3. Sanyal AJ. AGA technical review on nonalcoholic fatty liver disease. Gastroenterology 2002;123:1705-25.
4. Marceau P, Biron S, Hould FS, Marceau S, Simard S, Thung SN, Kral JG. Liver pathology and the metabolic syndrome X in severe obesity. J Clin Endocrinol Metab 1999; 84: 1513-1517.
5. Pagano G, Pacini G, Musso G, Gambino R, Mecca F, Depetris N, Cassader M, David E, Cavallo-Perin P, Rizzetto M. Nonalcoholic steatohepatitis, insulin resistance and metabolic syndrome: further evidence for an etiologic association. Hepatology 2002;35:367-372.
6. Marchesini G, Forlani G. NASH: from liver diseases to metabolic disorders and back to clinical hepatology. Hepatology 2002;35:497-49.
7. Angelico F, Del Ben M, Conti R, Francioso S, Feole K, Maccioni D, Antonini TM, Alessandri C. Non-alcoholic fatty liver syndrome: a hepatic consequence of common metabolic diseases. J Gastroenterol Hepatol 2003;18:588-594.
8. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of The Third Report of The National Cholesterol
9. Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). JAMA 2001;285:2486-97.
10. Chavez-Tapia NC, Tellez-Avila FI, Barrientose-Gutierrez T, Mendez- Sanchez N,
11. Lizardi-Cervera J, Uribe M. Bariatric surgery for non-alcoholic steatohepatitis in obese patients. Cochrane Database of Systematic Reviews 2010, Issue 1. Art No: CD007340. DOI: 10:1002/14641858.
12. Palaniappan L, Carnethon MR, Wang Y, et al. Predictors of the incident metabolic syndrome in adults: the Insulin Resistance Atherosclerosis Study. Diabetes Care 2004;27:788–93.
13. Bernard Rosner (2000), Fundamentals of Biostatistics, 5th Edition, Duxbury, page 80-24
14. Sunder Rao P S S , Richard J(2006) : An Introduction to Biostatistics, A manual for students in health sciences , New Delhi: Prentice hall of India. 4th edition, 86- 160 95.Suresh K.P. and Chandrasekhar S (2012). Sample Size estimation and Power analysis for Clinical research studies. Journal Human Reproduction Science,5(1), 7-13.
15. Duseja Ajay, Das Ashim, Das Reena, Dhiman RK, Chawla Y, Bhansali A, Kalra Naveen. The Clinicopathological Profile of Indian Patients with Nonalcoholic Fatty Liver Disease (NAFLD) is Different from that in theWest. Dig Dis Sci 2007;52:2368–23