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Research Article

AN ASSOCIATION OF METABOLIC SYNDROME WITH NONALCOHOLIC FATTY LIVER DISEASE

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ABSTRACT

Objectives: Nonalcoholic fatty liver disease is strongly linked with hepatic fatty infiltration and visceral adiposity, therefore, being a cause and a result of metabolic syndrome. The objective of the study is to find an association of metabolic syndrome (MetS) with nonalcoholic fatty liver disease (NAFLD).

Methods: A total of 342 subjects from which 86 NAFLD 86 control were suitably selected for study duration of 1 year. Diagnosis of nonalcoholic fatty liver disease was done by liver imaging and based on liver enzymes. MetS assessment was done by the national cholesterol education program adult treatment panel III (NCEP ATP III) criteria. Estimation of all biochemical and hematological parameters and liver enzymes was done following standard guidelines. Mean comparison of quantitative data in different groups was analyzed with one-way analysis of variance.

Results: There were significant high levels of body mass index, waist circumference, and lipid profiles in NAFLD patients in comparison to control population ($p<0.001$). According to the NCEP ATP III criteria, 59.3% of NAFLD were present with MetS where risk estimate was significant (odds ratio=2.15).

Conclusion: This study suggests that there is an increased in all the components of MetS and gross changes in biochemical markers in cases of NAFLD. Therefore, whenever MetS factors are met in the clinical checkups, patients must be diagnosed for NAFLD by imaging (fatty liver).

Keywords: Nonalcoholic fatty liver disease, Metabolic syndrome, Body mass index.

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INTRODUCTION

Metabolic syndrome (MetS), as insulin resistance (IR), represents an association of risk factors for cardiovascular disease and type 2 diabetes mellitus (T2DM) that co-occur more frequently than by chance. These risk factors may be high blood pressure (HBP), fasting glucose, increased level of triglycerides (TG), low high-density lipoprotein (HDL) cholesterol levels, and obesity (mainly abdominal), mainly in those with an excess of intra-abdominal or visceral adipose tissue [1]. It is assessed that 32.4% of the population worldwide has nonalcoholic fatty liver disease (NAFLD). The incidence and prevalence have rapidly increased over time, from 25.5% before 2005 to 37.8% in 2016 [2], synchronizing with the global obesity pandemic [3] and becoming one of the leading causes of cirrhosis in some countries [4]. Moreover, it is foreseen that, in terms of indication for liver transplantation, NAFLD will exceed the viral ethology [5]. Significantly higher overall prevalence of NAFLD was found in male than female. For diagnosis of NAFLD liver biopsy is the gold standard, since it is invasive, other noninvasive ways of diagnosis were used (serum biomarkers and imaging-based biomarkers).

Objectives

The objectives of the study are to find an association of MetS with NAFLD.

METHODS

This cross-sectional study recruited total 342 healthy persons from which 172 subjects enrolled. 86 persons were selected for cases and 86 persons for comparison group according to our inclusion and exclusion criteria at People's Hospital, Bhopal (M.P.) by systematic random sampling. Anthropometric features of the participants recorded. All participants underwent ultrasound (USG) and had their serum fasting blood glucose, aspartate aminotransferase, alanine aminotransferase, total cholesterol, TG, and platelet count were measured in a random blood sample, taken within 1 month of the USG.

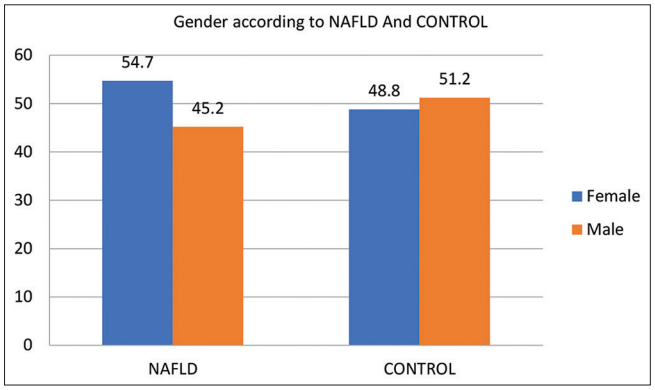
A new definition for MetS was developed by the national cholesterol education program (NCEP) adult treatment panel III (ATP) [6] in 2021 that did not require the expression of IR or a single factor for the diagnosis, but rather the of 3 out of presence, the 5 factors listed below which include abdominal obesity (waist >102 cm in males or >88 cm in females) (which is strongly associated with IR), elevated TG (>1.7 mmol/L or >150 mg/dL), reduced HDL cholesterol (<1.0 mmol/L or <40 mg/dL in males, <1.3 mmol/L or <50 mg/dL in females or drug treatment for low HDL cholesterol), elevated blood pressure (>130/85 mmHg or drug treatment for HBP), and impaired fasting glucose (IFG) (glucose >5.6 mmol/L or >100 mg/dL or drug treatment for elevated blood glucose) (IFG or T2DM).

RESULTS AND DISCUSSION

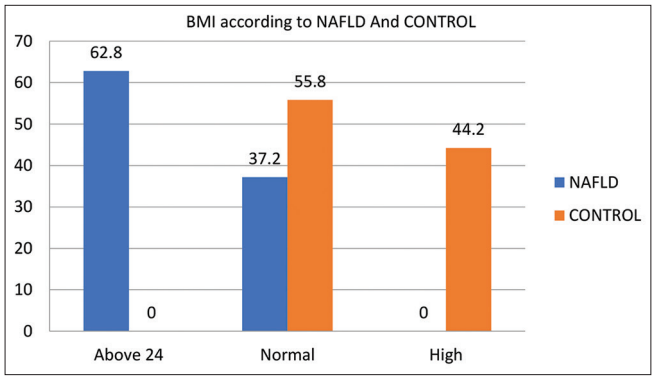
There were substantial increased levels of body mass index (BMI), waist circumference, and lipid profile tests in NAFLD patients in comparison to control population ($p<0.001$). Further, according to the NCEP ATP III criteria, 59.3% of NAFLD were present with MetS where risk estimate was significant (odds ratio [OR]=2.15).

It was found that total 172 recruited persons from 86 NAFLD cases, 47 females, and 39 males were there and from 86 controls, 42 female and 44 males were present (Graph 1, Table 1).

BMI values, high >24, normal between (18 and 24), and low <18. In our study, it was found that distribution of NAFLD cases was 62.8% high, 37.2% normal, and 0.00% with low BMI (Graph 2, Table 2) were found in while in control group, 44.2% were with low BMI, 55.8% with normal BMI, and 0.00% with high BMI.



Graph 1: Distribution of NAFLD cases and control group genderwise



Graph 2: Distribution of body mass index in NAFLD and control group

Table 1: Distribution of NAFLD cases and control group gender wise

Gender	NAFLD		Control	
	Frequency	Percent	Frequency	Percent
Female	47	54.7	42	48.8
Male	39	45.2	44	51.2
Total	86	100.0	86	100.0

NAFLD: Nonalcoholic fatty liver disease

Table 2: Distribution of body mass index in NAFLD and control

BMI	NAFLD		Control	
	Frequency	Percent	Frequency	Percent
High	54	62.8	00	00
Normal	32	37.2	48	55.8
low	00	0	38	44.2
Total	86	100.0	86	100.0

NAFLD: Nonalcoholic fatty liver disease, BMI: Body mass index

Our study showed that NAFLD cases associated with MetS were 59.3%, i.e., 51 cases out of 86 cases, while in control group, 28 people were present with MetS.

In NCEP ATP III criteria, 13.66% of NAFLD were present with MetS with OR=2.15 where risk estimate was significant while in our study, 59.3%

Table 3: Metabolic syndrome distribution in NAFLD and controls

MS	NAFLD	Control
Yes	51	28
No	35	58
Total	86	76

NAFLD: Nonalcoholic fatty liver disease

cases of NAFLD were present with MetS (Table 3). In the study of Tse *et al.*, the prevalence of MetS was 11.11% based on diagnostic criteria international diabetes federation, NCEP ATP III [7]. NAFLD cases were 62.8% high, 37.2% normal, and 0.00% with low BMI were found in our study similarly the association between BMI and NAFLD, which were 11.4%, 10.8%, 10.2%, respectively [8].

CONCLUSION

This study suggests that there is an increased in all the components of MetS and gross changes in biochemical markers in cases of NAFLD. Therefore, whenever MetS risk factors are seen in the routine checkups, patients must be diagnosed for NAFLD by USG. Furthermore, endeavors are essential to study the NAFLD within the population to monitor this disease. Early diagnosis would help in delaying its complications and play a major role in preventing cardiac diseases as its association with MetS is frequent.

CONFLICTS OF INTERESTS

No conflicts of interest.

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