PREVALENCE OF NON ALCOHOLIC FATTY LIVER DISEASE IN PATIENTS WITH METABOLIC SYNDROME

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ABSTRACT

Objective: To determine frequency of Non Alcoholic fatty liver disease in patients with Metabolic Syndrome (MetS).

Study Design: Cross sectional study.

Place and Duration of Study: Department of medicine, CMH Okara, Jan 2013 to July 2013.

Patients and Methods: We included 491 adult males, diagnosed with metabolic syndrome (MetS), presenting in outpatient department for routine review. MetS was diagnosed as per the International Diabetes Federation (IDF) proposed criteria of 2004. Detailed history and examination of each individual was done and data entered in pre designed performa. Brightness and posterior attenuation on ultrasound abdomen were considered indices for fatty liver disease in presence of elevated ALT, negative hepatitis serology and absence of alcohol intake. All the data was analyzed using SPSS version 16. *p* value of less than 0.05 was considered statistically significant.

Results: Out of 491 participants with MetS, 222 (45.2%) had fatty liver disease. Mean BMI in patients with metabolic syndrome was 26.1 (± .89) and mean BMI in fatty liver patients was 27.3 (± 0.67).Out of total 5 components of Mets, patients with fatty liver disease had 3.24 (± 0.25) components, as compared to 2.1 (± 0.34) in whole of study group.

Conclusion: A large number of patients with metabolic syndrome have fatty liver disease. Fatty liver disease is more frequent in patients who are overweight and those having multiple risk factors of metabolic syndrome.

Keywords: Fatty liver, Hypertriglyceredemia, Metabolic syndrome, Obesity.

INTRODUCTION

According to the American Association for the Study of Liver Diseases, NAFLD is defined as fat accumulation in the liver exceeding 5% to 10% by weight, as determined from the percentage of fat-laden hepatocytes by light microscopy[1] whereas MetS is the name given to a cluster of risk factors which, occurring together increases the risk of Coronary Artery Disease (CAD), stroke, and type-II diabetes. Central obesity is the core cause of MetS as well as NAFLD as evident by different studies[2]. Prevalence of MetS worldwide is 17% to 25%[3] where as NAFLD from all causes is present in 33.6% of general population[4]. The prime cause of NAFLD is obesity which according to National health survey of Pakistan conducted in 2006 was present in 25% of Pakistani population[5].Non Alcoholic Fatty liver disease (NAFLD) is increasingly recognized entity to affect liver and leads to cirrhosis in about 20% of affected cases[6]. NAFLD is often associated with components of MetS like obesity[7] where its prevalence increases up to 74% of obese population, type II DM[8,9], Dyslipidemia[10] and Hypertension[11]. With increasing prevalence of obesity and MetS in the world the incidence of NAFLD is also increasing[12]. In United States NAFLD is the commonest cause of elevated liver enzymes[13].Serum ALT levels strongly co relates with liver fat but its normal value cannot rule out liver fat. Waist circumference (WC) is closely associated with liver fat contents as evidenced by Church TS et al[14] study in 2006. Insulin resistance is the key mechanism leading to deposition of fat droplets in hepatocytes. Although liver biopsy is the gold standard for diagnosis of NAFLD nevertheless it can be diagnosed noninvasively[15] with the help of ultrasound evidence of fat in liver parenchyma together with absence of viral hepatitis etiology and no history of alcohol/drug intake.Serum

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Aminotransferase (ALT) level is often abnormal in NAFLD but may be normal in some diagnosed cases[16].The purpose of this study is to find out the frequency of NAFLD in patients with metabolic syndrome in our population. As most of patients NAFLD are either asymptomatic or have vague complaints unless liver cirrhosis established so we did not study symptomatology of the disease.

PATIENTS AND METHODS

This cross sectional study was carried out in department of medicine, Combined Military Hospital Okara, from July 2012 to March 2013. Informed written consent was taken from each patient. We included 491 adult male soldiers in age range of 23 years to 52 years, diagnosed with metabolic syndrome (MetS), by consecutive sampling presenting in outpatient department for routine review. Those with endocrinopathies, secondary causes of obesity, those on amiodarone or drug or dietary treatment for obesity were excluded from the study. MetS was diagnosed as per The International Diabetes Federation (IDF) proposed criteria of 2004. Central obesity was essential element with waist circumference more than 90 cm (for south Asians) plus any two of the following: Triglycerides >150 mg/dL (1.7 mmol/L), HDL cholesterol <40 mg/dL (1.03 mmol/l), Systolic blood pressure >130, diastolic blood pressure >85 or treatment for hypertension, Fasting plasma glucose >100 mg/dL (5.6 mmol/L) or previously diagnosed type 2 diabetes. For the purpose of study fatty liver was diagnosed by presence of elevated ALT levels and presence of echo brightness (bright liver) and posterior attenuation on ultrasound of liver[17]. Hepatitis B and C serology and history of alcohol intake was obtained from all patients. Detailed history and examination of each individual done and data entered in pre designed performa. Body weight was measured in indoor light clothing to the nearest 0.1 kg using a SALTER 920 digital weighing scale (Salter Ltd, Tonbridge, UK). Waist circumference was measured at midway between iliac crest and lower rib margin at the end of normal expiration using a plastic flexible tape to the nearest 0.1 cm. WC > 90 cm was considered abnormal for the purpose of study. For blood pressure recording each patient was asked to sit quietly in a chair with his or her back supported for 5 minutes in a private, quiet and warm room before taking the measurement. Blood pressure was measured three times by the same physician with a table sphygmomanometer. For the purposes of analysis, the mean of the three measured values was considered. Use of the correct cuff size with the air bladder encircling at least 80% of the arm was ensured. Center of cuff was placed at heart level. Width of cuff was kept equal to at least 40% of arm circumference. Rate of deflation was fixed at 2 mmhg/Sec. All the participants of study underwent blood glucose fasting (BSF), serum, triglycerides(S TGs), ALT levels and HDL-C levels using automated analyzers. Those with elevated ALT levels underwent HBsAgand anti HCV antibody testing using ELISA. Ultrasound examination of all cases of metabolic syndrome was done by a consultant radiologist. Brightness and posterior attenuation on ultrasound abdomen were considered indices for fatty liver disease in presence of elevated ALT (more than 45 IU/l), negative hepatitis serology and absence of alcohol intake. Continuous variables were derived as means and standard deviation while categorical variables were described in percentages/frequencies. We used t test and Pearson chi square test as appropriate to the nature and distribution of the variables. All the data was analyzed using SPSS version 16. *p* value of less than 0.05 was considered statistically significant.

RESULTS

Out of total 491 participants in the study, age ranged from 20 years to 52 years with mean age of 31.6 years (±7.51). Frequency of non alcoholic fatty liver disease was 45.2% (222 out of 491 participants).

Mean BMI of whole of study group was 26.1 (± .89) and mean BMI in patients found to have fatty liver was 27.3 (±.67). Out of total 5 components of Mets, patients with fatty liver disease had 3.24 (±0.25) components,as compared to 2.1 (±0.34) in whole of study

group. No of risk factors in patients found to have fatty liver disease is shown in fig.

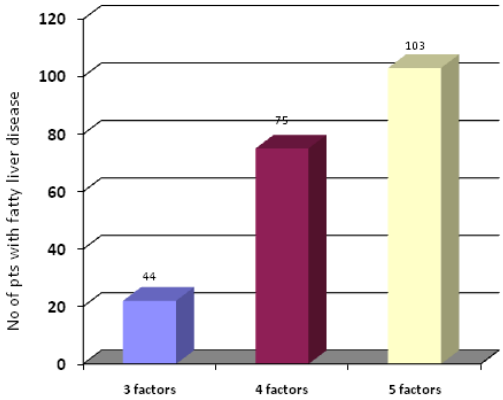

Figure: Number of patients of fatty liver disease in relation to number of risk factors of metabolic syndrome n= 222.

We also studied frequency of fatty liver disease in individual components of metabolic syndrome. In this study hypertriglyceredemia was present in 392 individuals (79.8%) and 188 (48%) of them had fatty liver. HDL cholesterol was low in 287 participants (58.3%) out of which 123 (42.8%) had fatty liver. Hypertension was present in 210 (42.7%) patients and 82 (39%) of them had fatty liver. Abnormal glycemic control was present in 297 subjects (60.4%) of MetS and 137 (46.1%) individuals had fatty liver.

In our study, 438 soldiers of MetS (89%) were found physically inactive and 213 (48.6%) of them had fatty liver whereas out of 53 active individuals with MetS, 9 (17%) had fatty liver. Fatty liver disease was more frequent in patients with increasing components of metabolic syndrome (*p* value 0.01).Clinical and demographic characteristics of study group are shown in table-1.

DISCUSSION

There are many studies finding prevalence of MetS in patients of NAFLD but few to find prevalence of NAFLD in MetS. No one knows which one of them appears first. In one of the studies, 53% patients of NAFLD had MetS[18]. Prevalence of NAFLD in western countries is 20 to 40% of general population[4] whereas in Asia pacific region it is about 5 to 30%[19]. Recently a hospital based study by Naiz A et al in Pakistan had shown a frequency of approximately 13.5%[20]. But inNaiz A et al study which was conducted at PNS Shifa Hospital Karachi in 2010 diabetic patients were excluded so it is not the true representation of the bulk of NAFLD in Pakistan. Another study was carried out In fauji foundation hospital Rawalpindi in2008 by Bano U et al[21] in which 100 cases of NAFLD were evaluated to find cause and it was found that DM (34%) and obesity (39%) were the most common etiologies.No study is yet carried out in Pakistan to detect prevalence of NAFLD in the back ground of diagnosed cases of MetS. This is one of the earliest studies of its own type in Pakistan. In addition, higher sample size and response rate were the main strengths of the study. In our study 45.2% cases of MetS had fatty liver disease at the base line. Prevalence of NAFLD in our study is greater than prevalence of NAFLD in general population and NAFLD of any cause as given in Szczepaniak LS et al[4] and Kotronen A et al[22] research. MetS predisposes individuals to develop NAFLD

Table-1: Clinical and demographic characteristics of study group n=491.

	Fatty liver disease n=222	Absence of fatty liver disease n=269	*p* value
Age years	41.3 (± 6.43)	34.1 (± 7. 21)	0.001
BMI	27.5 (± .67)	26.2 (± .89)	0.01
Waist circumference	104.2 (± 4.27)	94 .4 (±3.16)	0.003
Serum TGs mg/dl	196 (± 15.3)	152 (± 19.5)	0.02
Serum HDL mg/dl	37 (± 9.2)	48 (± 8.6)	0.54
Blood glucose fasting mg/dl	101 (± 17.5)	92 (± 15.3)	0.01
Systolic BP mmHg	127 (± 6.7)	112 (± 6.3)	0.67
Diastolic BP mmHg	84 (± 4.2)	76 (± 3.8)	0.52
No. of risk factors of MetS	3.4 (± 0.25)	2.1 (± 0.34)	0.01

with the passage of time.In Hamaguchi M et al study[23] it was observed that over subsequent 414 days from base line examination day, the patients with MetS at the base line had much more chances to develop NAFLD than others. In this study 84.6%, 55.4%, 37% and 61.7% cases of NAFLD had hypertriglyceredemia, low HDL-C, high BP and abnormal glycemic control respectively.These observations support all old studies having more or less similar prevalence of above mentioned variables[24]. Our study had many Limitations. Our study was exclusive for male gender although females are less prone to NAFLD[25]. Secondly although ultrasonography has relatively high sensitivity (82% to 94%) and specificity (66% to 95%) in detecting fatty liver[26], it may give an incorrect diagnosis in 10% to 30% of cases. Moreover, it cannot distinguish steatohepatitis from simple steatosis, nor does it distinguish between nonalcoholic fatty liver disease and alcohol-related liver disease. Thirdly raised ALT was one of the essential criteria for diagnosing NAFLD where as ALT may be normal owing to its fluctuating values in natural course of NAFLD[16].

CONCLUSION

A large number of patients with metabolic syndrome have fatty liver disease. Fatty liver disease is more frequent in patients who are overweight and those having multiple risk factors of metabolic syndrome. Nevertheless, further research is required to explore this vital issue in detail.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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AUTHORS CONTRIBUTION

Raheel Iftikhar, data collection, statistical analysis and drafting the manuscript, Sultan Mehmood Kamran conception, study design, drafting the manuscript and data collection, Farrukh Sher lab evaluation of study subjects, funding, Amjad Khan refining the study design and critical revision.