Prevalence and Profile of Non-Alcoholic Fatty Liver Disease among Adults Undergoing Master Health Checkup, A Hospital based Cross Sectional Study

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ABSTRACT

Introduction: Non-alcoholic fatty liver disease (NAFLD) has emerged as a major public health problem in recent times. It is one of the neglected conditions in developing nations like India, due to scarcity of studies on the subject. Study objective was to assess the prevalence of NAFLD among patients undergoing master health check-up in a tertiary care teaching hospital and to analyze the profile of NAFLD cases.

Material and materials: The study was a hospital based analytical cross-sectional study. Conducted in a tertiary care teaching hospital in south India. People attending the master health checkup in the study setting from June 2015 to July 2018 were included. Chi square test was used to test statistical significance.

Results: A total of 818 patients were included, out of whom 130(15.89%) had NAFLD. The proportion of grade 1, 2 and 3 fatty liver was 79.23%, 13.84% and 6.92% respectively. The difference in waist circumference and HDL values were statistically significant between male & female (P value <0.001 and 0.007 respectively). No other components of Metabolic syndrome had shown statistically significant difference between males and females. The difference in grade of NAFLD across the age group is found to be significant with a P- value of 0.035. Grade of NAFLD was not associated with any other diet or lifestyle related parameters.

Conclusions: Significant proportion of healthy subjects are affected by NAFLD, some of them with severe grades, with key gender differences in some of the factors associated with NAFLD. Patients and clinicians needs to be sensitized regarding NAFLD.

Keywords: Non-Alcoholic Fatty Liver Disease, Adults Undergoing Master Health Checkup

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is histopathologically characterized by fatty infiltration of liver parenchyma, resembling alcoholic liver diseases, without a history of significant alcohol consumption or other established liver disease.[1] Some researchers have proposed around 5% infiltration of liver parenchyma may be considered as fatty infiltration.[2] The spectrum may range from simple fatty infiltration to associated inflammatory changes, presenting as NASH (Non Alcoholic Steato Hepatitis) to fibrosis of hepatic tissue, frank cirrhosis and even hepatocellular carcinoma (HCC) in minority of cases.[3] It can also lead to plethora of thrombotic, vascular complications.[4] It is associated with wide range of other metabolic conditions, more importantly metabolic syndrome, diabetes mellitus and obesity.[5-7]

Even though, it has been perceived as a major public health problem of developed and western world, it has emerged as a major public health problem in Asian countries, including India.[8] The reported prevalence of NAFLD was ranging between 20 to 30%, with about 2 to 3% of them progressing to NASH in western countries.[9] But the exact large-scale prevalence studies are scarce on Indian population. Among the general population, the reported prevalence varied from 9% in rural populations to 32% in urban populations.[10] As per SPRINT study, which was one of the large scale multicentric study from 101 cities across India, the overall prevalence of NAFLD was 56.5% among T2DM patients aged between 25 to 84 years. The prevalence was lowest at 44.1% in western India to as high as 72.4% in northern states.[11,12] Considering the scarcity of studies documenting the profile of NAFLD cases and the magnitude heterogenicity within the country, it is highly essential to conduct studies on local ethnic population groups. These studies will provide more relevant data about the profile of NAFLD in local population to the clinical practitioners and aid in effective screening and management of the same. The current study was conducted with the objective of documenting the prevalence of NAFLD among patients undergoing master health checkup in a tertiary teaching hospital in south India and to analyze the profile of NAFLD cases.

MATERIAL AND METHODS

The study was a hospital based analytical cross-sectional study which included, people attending the master health checkup in the study setting. The cases included were people satisfying the inclusion criteria from June 2015 to July 2018

Sample size: A total of 818 patients attending master health checkup were included in the study by universal sampling.

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Inclusion criteria:

- Adults aged above 20 years
- Both male and female
- Undergoing master health check up

Exclusion criteria:

- Alcoholic patients.
- Study procedure

All the patients were evaluated by clinical history, anthropometric assessment, including Height, Weight, Waist circumference. BMI and Waist hip ratio were calculated. Blood sample was collected from the patient and it was sent to the laboratory for fasting Lipid profile, fasting blood glucose, post prandial blood glucose.

Metabolic syndrome was defined as presence of 3 or more of the following 5 components of (1) fasting glucose >100 mg/dL; (2) central obesity (waist circumference>102 cm [men] and >88 cm [women]); (3) arterial pressure >130/85 mm Hg or pharmacologically treated; (4) triglyceride levels 150 mg/dL or use of fibrates; and (5) HDL-cholesterol <40 mg/dL (men) and < 50 mg/dL (women)

Waist circumference: For male, normal was<102 cm. For female <88 cm was considered as normal.

Waist/Hip ratio: For male, ≤0.9 was considered as normal and >0.9 was considered as abnormal. For female, ≤0.85 and > 0.85 were considered as normal and abnormal respectively. Then patient was sent for an ultrasound liver and radiologist had given diagnosis of mild/moderate/ severe fatty liver based on the following criteria:

Mild: Increased echotexture when compared to that of right kidney.

Moderate: Increased echotexture when compared to mild obliteration of diaphragmatic echoes.

Severe: Increased echotexture when compared to non-visualisation of diaphragmatic echoes.

The patients in statin or in antihypertensive therapy, are noted. Blood pressure from the right arm was measured in sitting posture. Relevant details on dietary habits, physical activity, sleep etc. were also noted to provide appropriate counselling.

Ethical issues: Informed consent has been obtained from all the participants before getting information from them. Confidentiality of the data was maintained thought the analysis and presentation of the study findings.

STATISTICAL ANALYSIS

Quantitative variables were summarized by mean and standard deviation. Categorical variables were summarized by frequency and proportion.

RESULTS

A total of 818 patients attending master health checkup were observed (Table 1). Among the study population, 130 (15.89%) participants had NAFLD. (Table 1)

Majority of 49 (37.69%) participants were aged between 41 to 50 years, followed by 51 to 60 years, 31 to 40 years, 61 to 70 years, 21 to 30 years and >70 years age group was 27.69%, 13.84%, 12.30%, 6.15% and 2.30% respectively. Among the study population, 75 (57.69%) participants were male remaining 55 (42. 30%) participants were female. majority of 46.15% participants were BMI 25 to 29.9. The proportion of BMI 30 to 39.9, <25% and >39.9 was 36.15%, 15.38% and 2.30% respectively. (Table 2)

The difference in waist circumference between the gender is found to be significant with a P- value of <0.001. The difference in fasting blood sugar between the gender is found to be insignificant with a P- value of 0.282. The difference in HDL between the gender is found to be significant with a P- value of 0.007. The difference in triglycerides between the gender is found to be insignificant with a P- value of 0.849. The difference in blood pressure between the gender is found to be insignificant with a P- value of 0.870. (Table 3)

Out of 130, 103 (79.23%) had grade 1 fatty liver, 18(13.84%)

NAFLD	Number	Proportion
Yes	130	15.89
No	688	84.11

Table-1: Incidence of NAFLD among the study population

Parameters	Frequency	Percentages
Age group		
21-30	8	6.15%
31-40	18	13.84%
41-50	49	37.69%
51-60	36	27.69%
61-70	16	12.30%
>70	3	2.30%
Gender		
Male	75	57.69%
Female	55	42.30%
BMI		
<25	20	15.38%
25-29.9	60	46.15%
30-39.9	47	36.15%
>39.9	3	2.30%

Table-2: Age, gender and BMI distribution of NAFLD patients (N=130)

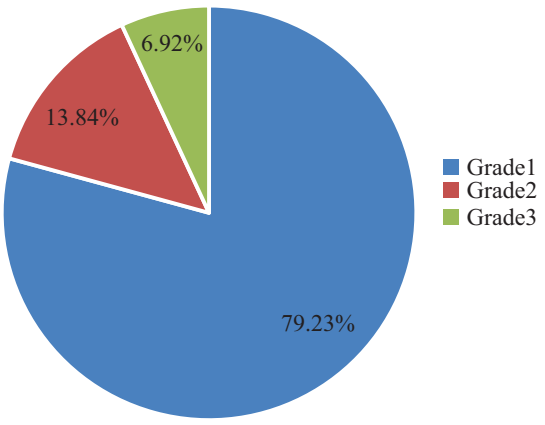

Figure-1: Grading of fatty liver among the study population.

Components of metabolic syndrome	Men (N=75)	Women (N=55)	P Value
Waist circumference (>102cm in men; >88cm in women)	26(34.66%)	40(72.72%)	<0.001
Triglyceride≥150 or treated	50(66.66%)	29(52.72%)	0.849
FBG≥ 100g/dL	58(77.33%)	43(78.78%)	0.282
HDL (>40 in men;> 50 in women)	45(60%)	48(87.6%)	0.007
Systolic BP >130m Hg or diastolic BP >85mm Hg or treated	42(56%)	30(54.54%)	0.870

Table-3: Summary of components of metabolic syndrome among NAFLD population

Parameters	Grade 1	Grade II	Grade III	P Value
Grading and age				
21-30(N=9)	9(100%)	0(0%)	0(0%)	*
31-40(N=18)	12(66.67%)	5(27.78%)	1(5.56%)	
41-50(N=49)	40(81.63%)	7(14.29%)	2(4.08%)	
51-60(N=36)	28(77.28%)	3(8.33%)	5(13.89%)	
61-70(N=15)	12(80%)	2(13.33%)	1(6.67%)	
>70(N=3)	2(66.7%)	1(33.3%)	0(0%)	
Vegetable consumed per day				
<=25 g(N=50)	42(84%)	5(10%)	3(6%)	0.70
26 to 50 (N=67)	50(74.63%)	12(17.91%)	5(7.46%)	
>50 (N=13)	11(84.61%)	1(7.7%)	1(7.7%)	
Non-veg consumption/ wk				
Once or twice(N=101)	82(81.2%)	12(11.9%)	7(6.93%)	*
3-4 times(N=13)	8(61.5%)	4(30.8%)	1(7.69%)	
Almost all days(N=10)	10(100%)	0(0%)	0(0%)	
nil(N=6)	3(50%)	2(33.3%)	1(16.7%)	
Oil consumption / month				
<1L(N=65)	53(81.5%)	8(12.3%)	4(6.15%)	0.76
>or = 1L(N=65)	50(76.9%)	10(15.4%)	5(7.69%)	
Exercise				
Doing exercise(N=49)	40(81.6%)	5(10.2%)	4(8.16%)	0.99
Not doing(N=81)	63(77.8%)	13(16.1%)	5(6.17%)	
*No statistical test was applied- due to 0 subjects in the cells				

Table-4: Association of lifestyle parameters with grade of NAFLD in the study population

had grade 2 fatty liver and 9 (6.92%) had grade 3 fatty liver. (Figure 1)

The difference in grade of NAFLD across the age group is found to be significant with a P- value of 0.035. The difference in grade of NAFLD across the vegetable consumed per day is found to be insignificant with a P-value of 0.70. The difference in grade of NAFLD across the non-veg consumption/week is found to be insignificant with a P-value of 0.15. The difference in grade of NAFLD between oil consumption/month is found to be insignificant with a P- value of 0.76. The difference in grade of NAFLD between exercise is found to be insignificant with a P- value of 0.99 (table-4).

DISCUSSION

The prevalence of NAFLD was 15.89% in our study. The reported prevalence of NAFLD is quite variable across the countries and even there were huge subnational variations reported from India. Majumdar, A., et al.[13] have reported 30.7% prevalence of NAFLD among rural Haryana population, which is considerably higher than the current study. Another study conducted on south Indian population has reported a overall prevalence of NAFLD of 32%.[14] The reported prevalence is ranged from 9% in rural populations to 32% in urban populations.[10]

In the current study, the proportion of male was slightly higher than the females. Many studies in the past had reported relatively higher risk of NAFLD in males compared to females. A study from south India had reported higher prevalence of 35.1% among men, compared to 29.1% in women.[14]

In the current study, BMI correlation with fatty liver is having clinical significance (p=0.05). NAFLD is more common in individuals with overweight and obesity than normal individuals. When compared with males (34%), a greater number of females (72%) had increased waist circumference which is clinically significant (p<0.001). The differences between the males and females with respect to various components of metabolic syndrome was analyzed in the current study. We have found waist circumference and HDL values to be significantly different between males and female NAFLD patients. A review by Lonardo, A., et al.[15] had pointed out the possibility of genetic composition, hormonal milieu and various other parameters to be responsible for key gender differences in the susceptibility to NAFLD and composition of the risk factor profile. Few candidate genes in hepatocytes were also proposed by few studies.[16]

In the current study, Out of 130, 103 (79.23%) had grade

1 fatty liver, 18(13.84%) had grade 2 fatty liver and 9 (6.92%) had grade 3 fatty liver. keeps on increasing till the age of 60 yrs. Grade 1 and Grade 3 incidence tend to fall beyond the age 50 & 60 respectively. This is having clinical significance ($p<0.035$). High vegetables intake, low non-veg intake, low oil consumption, regular physical activities had decreased incidence of fatty liver which is not having much significance. Severe grades of NAFLD were reported to be associated with coronary artery disease, even without metabolic syndrome by previous studies.[17] Hence studies have recommended screening of patients with higher grades of NAFLD for Coronary Artery Disease (CAD).[18]

CONCLUSION

Our report further highlights the association of NAFLD with features of the metabolic syndrome. Obesity, diabetes, hypertension, and hyperlipidemia have been repeatedly reported in NAFLD. So, it is of paramount importance in educating NAFLD patients about the association of metabolic syndrome and complications and the possible ways to prevent them like regular physical activity, maintain a normal BMI by gradually reducing their weight, adequate control oh blood pressure, sugar and lipids.

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