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Frequency of Different Grades of Obesity in Females with Non Alcoholic Fatty Liver Disease

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Abstract

Objective: To determine the frequency of different obesity grades in females with non-alcoholic fatty liver disease diagnosed by ultra-sonography.

Methodology: This was a descriptive cross-sectional study, compromising of 72 females diagnosed with non- alcoholic fatty liver disease on ultrasonography. Their association with different obesity grades was determined. Body mass index, blood sugar random, blood pressure and lipid panel were conducted in all patients. Dietary data and physical activity was ascertained through questionnaires.

Results: 35 (48.6%) patients were diagnosed with grade I, 34 (47.2%) with grade II and 3 (4.16%) with grade III non-alcoholic fatty liver disease. 19 (26.38%) patients were overweight, 26 (36.11%) patients belonged to class I obesity while 15(20.83%) and 4(5.55%) patients belonged to class II and class III obesity respectively. Statistical analysis showed 25 patients (35%) had diabetes while 23 (32%) had hypertension. 57 patients (79.2%) were on fatty diet and 67 (93%) patients had sedentary lifestyle.

Conclusion: There is significant correlation between fatty liver disease and raised body mass index with sedentary lifestyle being the most significant factor contributing to raised body mass index in patients with non-alcoholic fatty liver disease.

Keywords: Non-alcoholic fatty liver disease (NAFLD), body mass index (BMI), metabolic syndrome.

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Introduction

Non-alcoholic fatty liver disease (NAFLD) is the commonest form of liver disorder leading to important public health problems.[1]. The prevalence of NAFLD is increasing due to increased incidence of obesity with correlation between high BMI and lipid accretion in the liver.[2] Estimated prevalence of fatty liver is between 6.3% and 33% in the general population and as high as 69% in diabetics.[3]

NAFLD shows a wide range of hepatic pathology. At its most benign, a rise of >5% in the liver weight is seen which is due to increased hepatic triglyceride content. A median stage of lobular inflammation and ballooning (steatohepatitis) is reported while fibrosis and cirrhosis are at the extreme end of the disease spectrum[4]. Different phenotypic manifestations of metabolic syndrome like obesity, diabetes, dyslipidemias and hypertension are all associated with NAFLD, making it the hepatic element of the metabolic syndrome.[5, 6]

The prevalence rate of NAFLD rises with a rise in the body mass index as evidenced by a large population based study which found that 91% of individuals with body mass index >30 kg/m^2 had steatosis on ultrasound.[7] Thus an increase in body mass index (documented by different grades of obesity) worldwide due to modern lifestyles including dietary habits and limited physical activity increases the possibility of development of fatty liver disease and its associated complications like cirrhosis and cardiovascular diseases. [8]

The prime aim of this study was to document the prevalence of obesity and its different grades in a female population already diagnosed with NAFLD on the basis

of ultrasonography. The study also explored the relationship of raised BMI in patients with NAFLD with other components of the metabolic syndrome (like diabetes mellitus, dyslipidemia and hypertension), age, dietary factors and physical activity.

Methodology

The study was done in the OPD of medical and radiology departments of HBS General Hospital from September 2018 to April 2019. After approval from the hospital's Ethical committee, 72 female patients with fatty liver on ultrasound were selected for the study. These patients were briefed on the purpose of this study and a written, informed consent was taken. Demographic data, socioeconomic as well as health related variables were collected in a questionnaire with a detailed clinical history and physical examination. The exclusion criteria included women who were pregnant, having history of alcohol consumption, using lipid lowering agents or drugs inducing fatty liver, diagnosed with viral hepatitis, autoimmune hepatitis or other forms of chronic liver disease.

Fatty liver was diagnosed on ultrasound with the use of a 5 Hz probe (Toshiba) and graded as I, II and III. Height and weight were recorded with the patient in light clothing and no shoes. BMI was calculated as weight (kg) divided by height (meters) squared. BMI was graded according to the NIH criteria. Standardized physical examination was performed in the hospital that included two B.P readings 20 minutes apart with the subject sitting, from right arm with mercury sphygmomanometer. Hypertension was defined (AHA 2018 guidelines) as systolic B.P of > 130mmHg or a diastolic B.P of > 85mmHg (based on a mean of two readings) or patient currently on anti-hypertensives. Blood samples were obtained from the subjects (5 ml) to determine the blood glucose levels and the lipid profile parameters. Dietary data was collected with the help of a food frequency questionnaire. Physical activity of every patient was validated and lifestyle declared as sedentary or active according to a specific questionnaire.

The demographic and clinical data was entered into Statistical Package for Social Sciences (SPSS version 21). The results were reported as means and standard deviations for continuous variables and as frequencies and percentages for categorical variables. Association between variables was ascertained through chi-square test with a p value of ≤0.05 considered significant.

Results

This study was based on the data of 72 females with NAFLD. The mean age of the sample was 42.25 years (SD ± 8.13). According to ultrasonography, 35(48.6%) patients had grade-I, 34(47.2%) had grade-II and 3(4.2%) had grade-III NAFLD.

BMI analysis of the patients included in this study showed mean value of 31.6 kg/m^2 with a SD of ± 5kg/m^2. Only 11% (n=7) patients had normal weight while the remaining patients showed varying degrees of obesity. The categorization of the patients in different classes of obesity on the basis of BMI is shown in Figure-I.

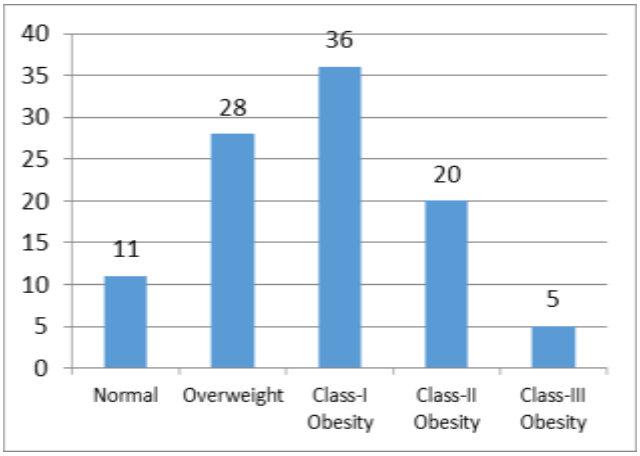

Figure 1. Distribution of the study sample on the basis of BMI (%)

A comparison of classes of obesity with grades of NAFLD is shown in Table I. A comparison of the demographic clinical variables with BMI is given in Table II.

Discussion

The current study looked at the frequency and grades of obesity in patients with non alcoholic fatty liver disease (NAFLD). The pooled prevalence of obesity in NAFLD is reported to be 51%[9]. The results of the current study show that this figure may even be higher in local population. Out of 72 NAFLD patients included in the study, 89% (n=65) were overweight or obese with a mean BMI of 31.6 kg/m^2. A study conducted in UK by Loomis et al showed a linear increase in the diagnosis of

Table 1: Distribution of patients according to grades of NAFLD and classes of obesity

Grade of NAFLD	Total	Normal	Overweight	Class-I	Class-II	Class-III
I	35	6	8	15	3	3
II	34	2	10	10	11	1
III	3	0	1	1	1	0

Table II: Demographic and clinical variables in the study patients.

		BMI		Total	
		Normal	Raised		p-value
Age	<40	3	27	30	
	>40	5	37	42	
					0.523
Diet	Fatty	5	52	57	
	Non-fatty	3	12	15	
					0.218
Physical Activity	Sedentary	6	61	67	
	Active	2	3	5	
					0.033*
HTN	yes	2	21	23	
	no	6	43	49	
					0.655
DM	yes	2	23	25	
	no	6	41	47	
					0.54

fatty liver with increasing BMI.[10] They estimated that the risk of fatty liver disease was 5 to 9 folds higher at BMI of 30–32.5 kg/m^2 compared to the persons with body mass index of 20-22.5 kg/2. It is, therefore, important that patients with a high BMI be screened for NAFLD at an early stage and those with positive finding should be educated about the direct link between weight and fatty liver.

The current study also looked at the demographic and clinical variables involved in the link between obesity and NAFLD. Our sample had a mean age of 42.25 years. These results are comparable with the study conducted by Latif et al in 2017 which showed mean age of 45.9 years in NAFLD patients.[11] This suggests that NAFLD is more likely to be seen in middle aged over weight individuals. 67 (93%) patients in our study had a sedentary lifestyle which was shown to have statistically significant association with raised BMI. Keeping in mind the association between body weight and steatosis, the presence of sedentary life style is an indirect independent risk factor for NAFLD. This also shows that life style modification targeting increased physical activity may be the cornerstone of managing NAFLD in overweight and obese patients. A comprehensive review by Mittendorfor et al evaluated the effect of lifestyle changes like weight loss on fatty liver revealed that decrease in weight improved the liver function and decreased the intrahepatic TG and fibrosis.[12]

Our results also showed that type-2 diabetes and hypertension were common co-morbidities in patients of NAFLD who had high BMI; figures of 32.8% (n=23) and 24.7% (n=25) respectively. A review of NAFLD by Byrne et al stated that NAFLD increased the risk of type-2 diabetes by 5.5 folds and this risk increased fourteen folds in patients where obesity and insulin resistance were also present.[13] Similarly, Suarez et al showed that NAFLD and obesity lead to a 21% increase in cases of hypertension.[14] Studies have also shown that the presence of diabetes and hypertension are associated with early and severe progression of liver pathology in these patients.[15,16] While diabetes and hypertension remain a common finding in our outpatient departments, this link with fatty liver is often overlooked. Ultra sonographic screening of patients with one or more of these risk factors may be warranted in routine clinical assessments.

One of the limitations of the study was that ultra-sonography rather than liver biopsy was used to diagnose NAFLD. The latter remains the gold standard for detection of early fatty changes but is invasive and expensive. Another limitation was the study sample consisted of only females only from a single center and hence the results may not be generalized to other population cohorts.

Conclusion

A significant proportion of NAFLD patients have raised BMI with associated diabetes and hypertension. Sedentary lifestyle is the most significant factor contributing to raised body mass index in patients with non-alcoholic fatty liver disease.

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Authors Contribution:

[1,3]Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work & Final approval of the version to be published

[2,4,5] Drafting the work or revising it critically for important intellectual content;