Nutrient intake of patients with non-alcoholic fatty liver disease in Dhaka city, Bangladesh: A cross-sectional pilot study

M B Hossain, Tasmia Tasnim , Sanjida Alam, Joytun Neen

Dept. of Nutrition and Food Engineering, Faculty of Allied Health Sciences, Daffodil International University

Corresponding Author: Professor Dr. Md. Bellal Hossain , Head, Department of Nutrition and Food Engineering, Daffodil International University, Dhaka-1207, Bangladesh. Email: drbellal@daffodilvarsity.edu.bd

Abstract: *Dietary behaviors are fundamental in the progress of almost all diseases including hepatic lipid accretion, known as "nonalcoholic fatty liver disease (NAFLD)". Be that as it may, there are restricted examinations in regards to the dietary propensities for patients with perpetual liver illness. This pilot study was carried out to evaluate feasibility of a large-scale project in terms of data collection and research process. A cross-sectional examination was directed on 20 NAFLD patients going to the outpatient division of Bangladesh Institute of Health science (BIHS). All patients underwent abdominal ultrasound, biochemical tests, dietary evaluations, and anthropometric evaluations. Their food intake was measured by a food-frequency questionnaire and 24-hour food recall.The mean age of the patients was 53±1.8 years, 50% of the individuals were men, most participants were overweight and 30% had NAFLD with fibrosis. There was no significant difference in nutrient intake and fat related diet behavior between patients with and without fibrosis. Yet fat related diet was found to be significantly associated with high LDL cholesterol levels and age. Due to small sample size, no significant impact of diet pattern was observed on the severity of NAFLD patient among included subjects. Future studies need to be carried out with a larger sample size and among subjects not exposed to diet intervention.*

Keywords: ***NAFLD , NASH, Diabetes, BMI, LDL , DIET FIBROSIS***

Introduction

"Nonalcoholic fatty liver disease (NAFLD)" is a manifestation of an abnormality of fat metabolism within the liver[1,2]. The liver is involved in synthesis and exports fat to other parts of the body, while taking away fat from the blood either released by other body tissues, like fat cells, or absorbed from the food we eat. In NAFLD, amplified amounts of fat are removed from the blood and/or are generated by liver cells, and not enough is shipped by the cells. As a result, fat amasses in the liver [3,4].

NAFLD is classified as either fatty liver or steatohepatitis (NASH). In both cases, there is an abnormal amount of fat in the liver cells, but, in addition, in NASH there is inflammation within the liver, which destroys the liver cells and are swapped by scar tissue[5,6].

Role of nutrients

Monosaccharides like fructose, have been associated to NAFLD, as it is more lipogenic and mediates less insulin secretion than glucose or sucrose. Overfeeding with fructose in human

subjects' have shown an increase in TG and IHTG with type -2 diabetes[7.8.9]. Fiber, both insoluble and soluble, has demonstrated the benefit in diabetes and prevention by dropping postprandial glucose response and improving some lipid profiles[11,12].
The protein intake reduces IHTG associated with high calorie/high fat feeding, but total dietary protein intake was not related with NAFLD[11-16]. Vitamin E improves damage liver tissue significantly of NASH patients after intake 400 IU [13,14]. Specific types of fat play a significant role in NAFLD pathophysiology in addition to the total fat content of the diet. Saturated fat has been linked with diabetes, cardiovascular disease and the metabolic syndrome [10]. Michael Roden's *etal*.,[7] resulted that the hepatic metabolism among 14 lean and healthy participants providing a quantity of fat (palm oil) equivalent to a single rich meal, led to elevated triglycerides, insulin resistance, and increased glucagon in the bloodstream. Scientists [8] suggested that saturated fats play an important role in the pathophysiology of NAFLD, involved in up-regulation of PGC-1b co-initiation of SREBP, promotion of ER stress and inciting hepatocyte apoptosis.
Information demonstrate that around 33% of the urban populace in substantial urban communities of India and Bangladesh has the metabolic syndrome. Because insulin resistance and the metabolic syndrome are broadly pervasive among Asians, it is sensible to accept that NAFLD would likewise be predominant; be that as it may, information are rare. Limited numbers of studies propose pervasiveness of NAFLD in the scope of around 6– 32% in urban India. No research could be found about the profile of fatty liver patients in Dhaka city. It was decided therefore to carry out a pilot study involving NAFLD patients visiting a specialized centre in Dhaka in order to study the general nutrient profile of the patients affected by disease including risk factors and complications.

The main purpose of the current study is to appraise the practicability of some essential element(s) of the full-scale study, which are the following:

- Judging the viability of key steps in the main study such as recruitment of participants, eligibility criteria, efficiency of data collecting tools etc.
- Assessing problems with time and resources that may occur during the main study
- Discover problems with data management and data collection with the team involved in the study

Objectives

1. Selection of patients according to inclusion criteria
2. Extraction of latest anthropometric and biochemical data of included participants
3. Diet intake measurement using specialized diet assessment tools
4. Analyze the relationship of disease severity with diet intake patterns

Methodology:

i. Study design

This study is a cross-sectional pilot study about the diet intake profile of NAFLD patients visiting the outpatient department of Bangladesh Institute of Health Science (BIHS). The subjects were screened for study of NAFLD. Inclusion criteria for cases included the following: Individuals between 20 and 60 years old who were diagnosed with NAFLD after giving blood tests and performing ultrasound, by a radiology specialist (the device used for ultrasonography

was Esaot Medica, fortified with a convex 3.5 MHz probe). All patients signed a consent form before interview.

ii. Clinical and biochemical evaluation

Clinical evaluation of each subjects were BMI, fasting serum glucose, lipid profile and liver enzymes like AST, ALT and GT.

iii. Dietary assessment

For determining the nutritional intake, a 24 h dietary recall questionnaire was filled for every individual. Then, foods were converted into their ingredients, and their amounts were calculated into grams and were encoded. Day by day intake of supplements and nutrients were evaluated by summing up all the crude sustenance expended on daily, week after week and month-to-month premise. Nutrient computation from raw food items was finished utilizing standard nutritive estimations of Bangladeshi foods.

iv. Statistical analysis

Statistical investigations were done using the Statistical Package for Social Sciences version 21.0 (SPSS Inc., Chicago, US). Histograms were used to display for normal distribution. Logarithmic transformation was applied to skewed variables at whatever point suitable. Continuous variables and categorical variables outlined as mean±SD and percent (%), respectively. Chi-square or Fisher exact test was utilized to explore the relationship between categorical variables. Comparisons between metric and dichotomous variable were done using independent sample t test or analysis of variance for normal distributed data. Additional analysis was executed using Pearson or Spearman correlation to scrutinize the connection between normal or non-normal data, respectively

Results and Discussions

A total of 20 patients with NAFLD were available to be included in the study from BIHS.

Clinical and demographic data are provided in Table 1

Table 1: Clinical and demographics data

Characteristics	**N=20**
Age (years, mean±SEM)	53±1.8
Sex (% male)	50%
Fasting plasma glucose (mg/l, mean±SD)	9.87±5.12
Total cholesterol (mg/dl)	209.95±22.6
ALT	11.98±47.3
AST	68.5±30.5
% Diabetics	85%

Body mass index (%)	
• Underweight (BMI<18.5)	0
• Normal (18.5≤BMI< 25)	30
• Over-weight (25≤BMI<30)	55
• Obese (BMI≥30)	15
NAFLD severity (%)	
• With fibrosis	30
• Without fibrosis	70

There was no real contrast in the benchmark qualities between the included subjects. The mean ± SD age of 20 subjects was 53±1.8 years (range 19–72 years), and 50% were male. The twenty subjects included in the study were all diagnosed with NAFLD and the prevalence of

NAFLD, with fibrosis was 30%.

Distribution of total cholesterol levels was found to be normal (Figure 1).

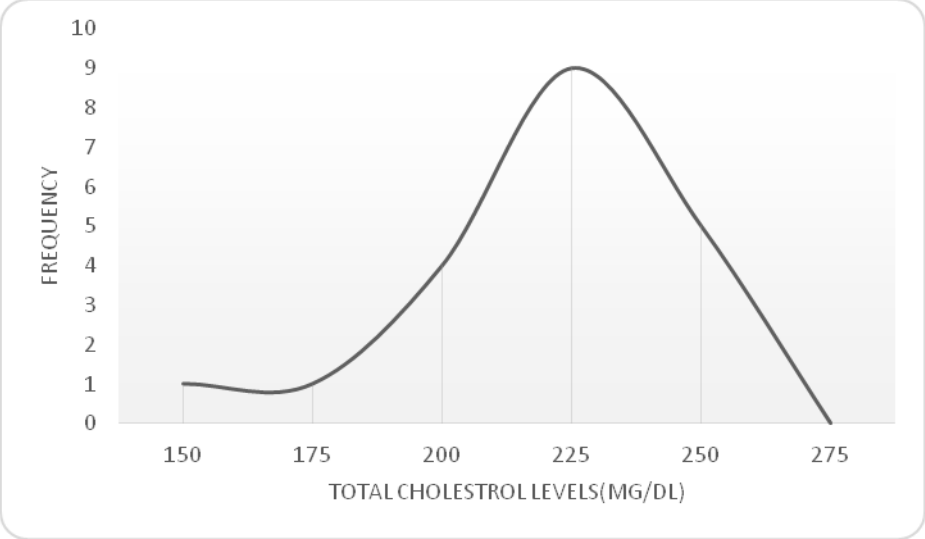

Figure 1: Frequency distribution of total cholesterol levels

LDL cholesterol Distribution was skewed to the right as a majority had high LDLC levels (figure 2)

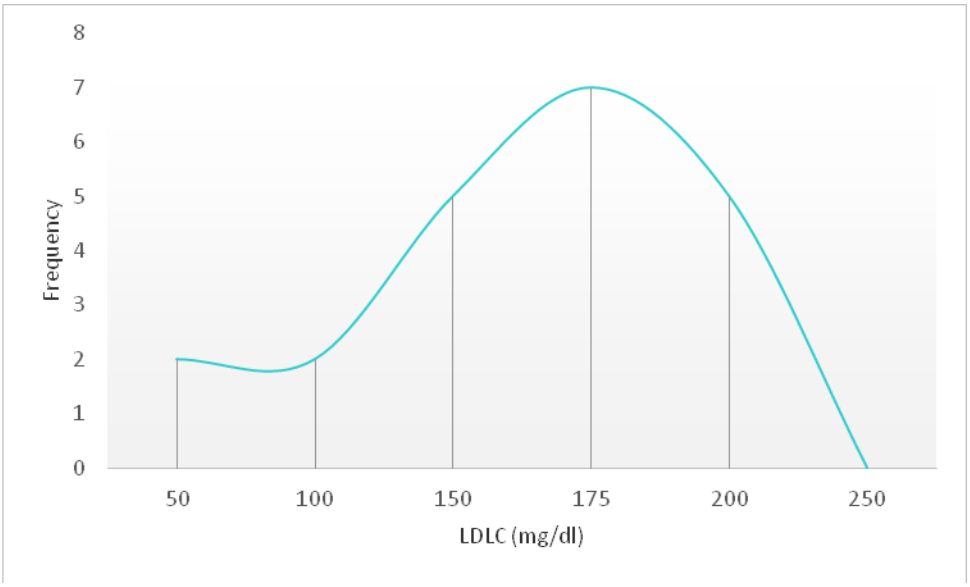

Figure 2: Frequency Distribution of LDL cholesterol levels

Association of nutrient intake pattern with liver fibrosis, BMI and cholesterol levels: Mean intake of fat, protein and carbohydrate was found to be 51.4±12.4, 70.2±13.5 and 250.2±43.8g/day respectively. Mean fat intake was found to be higher among those with fibrosis (figure 4) and those who were overweight (figure 5).

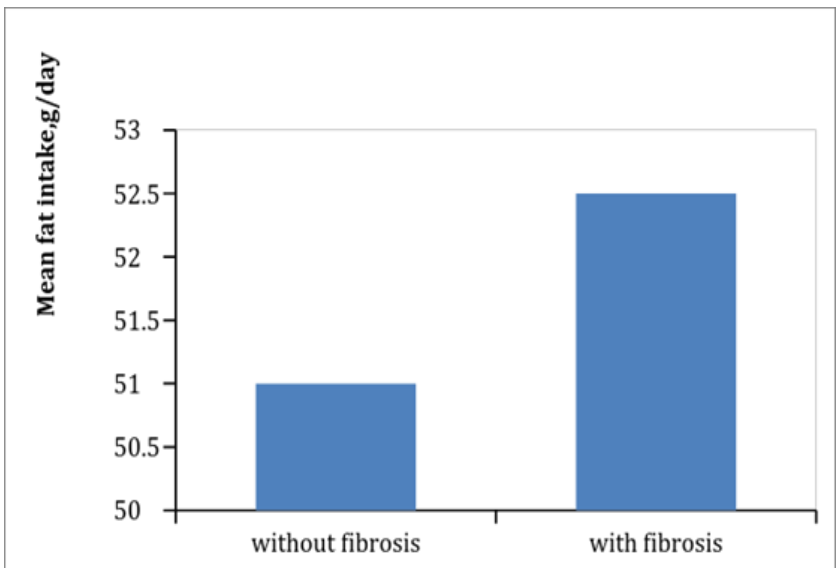

Figure 3: Mean fat intake among NAFLD patients

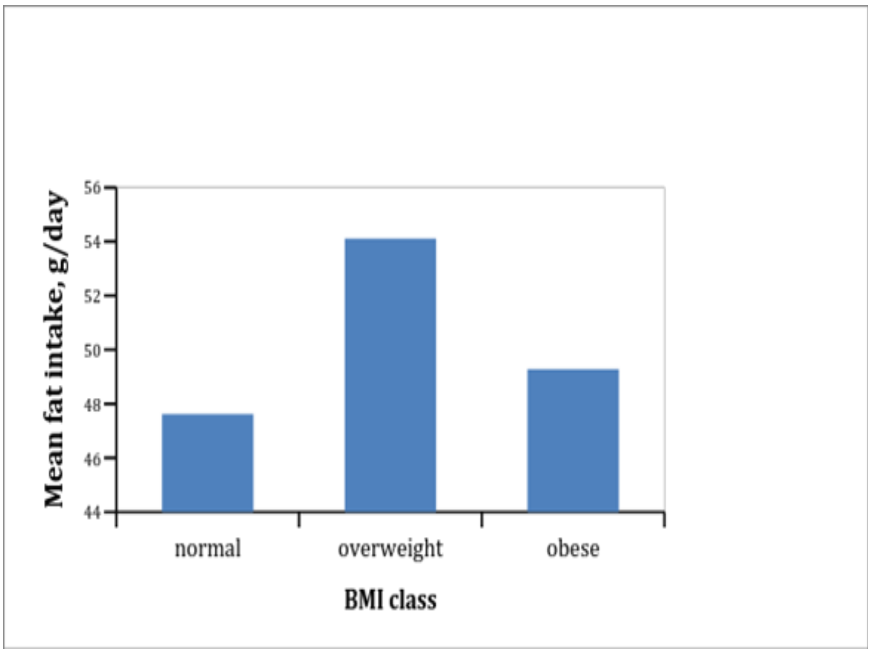

Figure 4: Mean fat intake, according to BMI classification

On the other hand, mean carbohydrate intake was found to be highest among those with normal weight, but the value is similar among those who are overweight and obese (Figure 6). The mean carbohydrate intake among NAFLD patients with fibrosis were found to be higher than those without fibrosis.

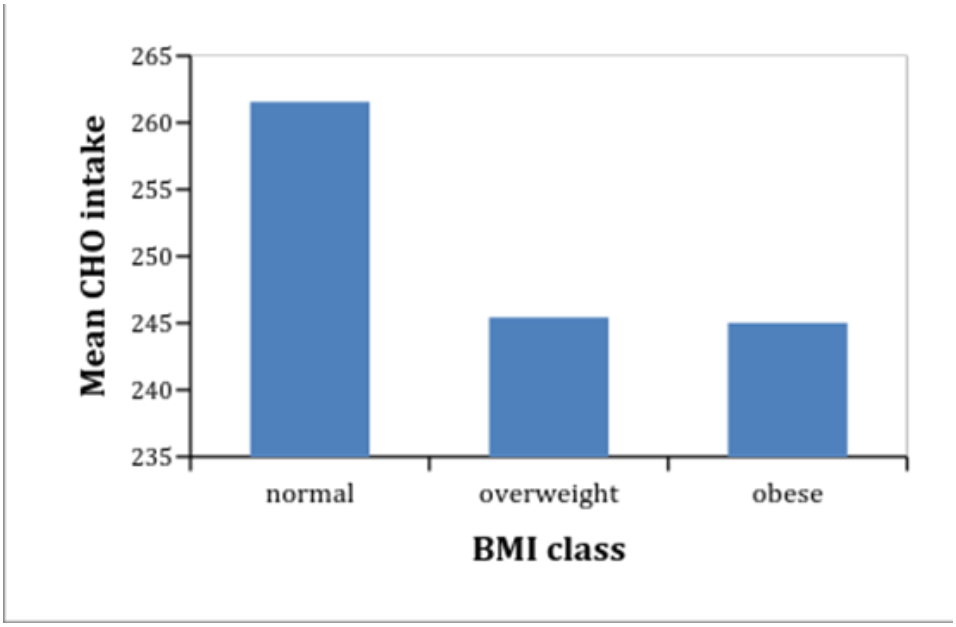

Figure 5

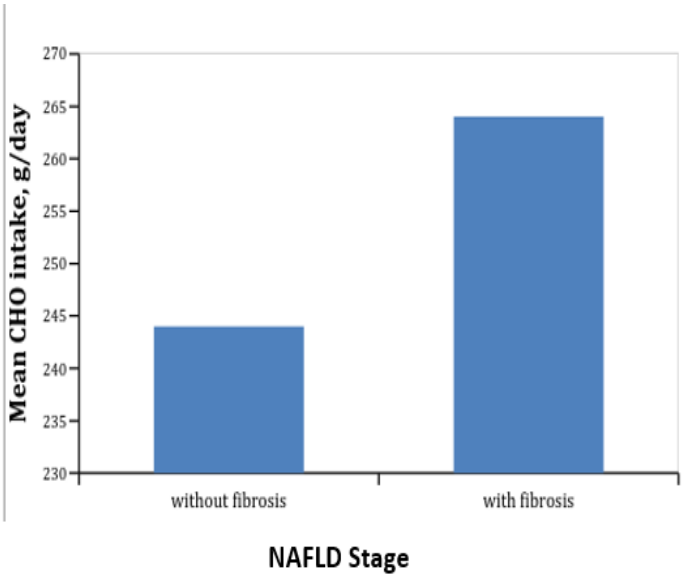

Figure 6

An independent sample t test was carried out to find out whether mean fat, protein and carbohydrate intake varied among 2 groups of NAFLD patient, with and without fibrosis, and it was found that no significant differences exist between the groups regarding nutrient intake.

Association of NAFLD stage with BMI and cholesterol levels: This cohort of patients with NAFLD was characterized from underweight, to obese depending on BMI values as shown in Table 1. A chi-square independent test was undertaken to find the association between BMI and severity of NAFLD. Significant relationship is found between the two variables. It was observed that more number of patients without fibrosis have borderline high cholesterol levels. The chi-square test has shown a substantial association of LDL cholesterol level with the presence of NAFLD irrespective of fibrosis.

Conclusion

This study is about nutritional assessment of patients with NAFLD. Patients with fibrosis have been found to consume greater quantity of carbohydrate and fat compared to patients without fibrosis although no significant difference intake exist between them. Our current study did not take into account the variety of nutrients consumed by patients or its association with severity of NAFLD except for carbohydrate, protein and fat. Previous studies have shown that NAFLD patients ingest foods higher in energy, protein, fat, saturated fatty acid, and polyunsaturated fatty acid. A study conducted among Japanese patients with NAFLD, have found significantly poor intake of micronutrients among them. A very low intake of fiber and fish rich in omega 3 have also been reported among patients[18]. The impact of certain food intake or certain dietary pattern in the severity of disease has also not been explored in the present study. Food intake pattern is an important aspect since previous studies have reported that increased intake of sweetened beverage and meat are linked with amplified risk of NAFLD among Israeli, Lebanese and Chinese patients[19,20]. Understanding the background dietary pattern of a disease is essential for determining the nutritional triggers behind the disease for better individualized patient treatment and education as suggested by Yasutake et al in 2014.

Further issues for example, physical movement and basal metabolic rate may likewise assume a noteworthy job in the improvement of NAFLD and its severity. In our study majority of patients were overweight which indicated an unhealthy diet pattern along with sedentary lifestyle which promotes fat accumulation in body. Our study incorporates some chief precincts such as inadequate sample size and the possibility of recall bias which is inherent in questionnaire studies. Future investigation should ideally include more invasive variables such as socioeconomic status, physical activity level, fat-related diet behavior and choice of food pattern among patients one year preceding to identification of fatty liver in forthcoming larger study to recognize the disease process in context of Bangladeshi population. A statistically accurate large sample size is required for better extrapolation of results.

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