



ORIGINAL ARTICLE

Comparison of the Nutrition of Patients with and without Non-alcoholic Fatty Liver in Tehran

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ABSTRACT

Introduction: A high prevalence of non-alcoholic fatty liver disease is associated with obesity and lifestyle disorders. The present study was conducted to compare the nutritional pattern of patients with and without non-alcoholic fatty liver disease referred to the hospitals affiliated to Tehran University of Medical Sciences in 2017. **Materials and Methods:** The present case-control study was performed on a total of 300 outpatients and inpatients, aged 18–65 years. These patients were referred to the ultrasonography section of the hospitals, and those recruited in the study were selected by the convenience method of sampling. According to the results of ultrasonography, these subjects were divided into two groups: case (100 patients) and control (200 subjects for increasing the statistical power of study). The data were analyzed using the Statistical Package for the Social Sciences (version 19), descriptive statistics, and the Mann–Whitney test. $P < 0.05$ was considered significant. **Results:** A significant difference was detected between the mean consumption of unhealthy foods in the case group as compared to the control group ($P = 0.001$), while those with fatty liver reported a low average intake of fruits and vegetables with a significant difference ($P = 0.001$). **Conclusion:** The results showed that patients with fatty liver complied with poor dietary habits as compared to individuals without the disease.

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is one of the most chronic liver diseases worldwide and is considered as the primary cause of visits to the hepatitis clinic among adults (1). Simple liver steatosis is observed in this disease that might develop into non-alcoholic steatohepatitis, fibrosis, cirrhosis, liver failure, and finally liver cancer (2). NAFLD is accompanied by a range of clinical and preclinical changes that are diagnosed with macroscopic steatosis without alcohol consumption and includes a range of simple steatosis such as non-alcoholic steatohepatitis, fibrosis, cirrhosis, and ultimately hepatocellular cancers (3, 4). The prevalence of NAFLD is reported to be 2-3-fold higher than hepatitis B, C, and alcohol-related liver disease (5).

Therefore, the treatment of this disease is mainly focused on the behavioral and lifestyle interventions including diet, increased physical activity, and weight loss (6-10). However, according to recent studies in Iran, the rate of physical activity has been decreasing over the last decade (11), and the rate of obesity and overweight has considerably increased in Iranian population (12). Thus, the prevalence of fatty liver disease might continue to increase in Iran. Moreover, the low level of physical activity and the consequent obesity

are the leading risk factors of NAFLD (8). Furthermore, the treatment of the fatty liver disease is highly responsive to behavioral changes. Interestingly, in most people with fatty liver, the only method of treatment is to increase the physical activity, reduce the energy intake, especially fatty foods, and remove the specific harmful foods. Thus, most of the treatment strategies have been designed to reduce weight and eliminate obesity (12). Hitherto, only a few studies have focused on the diet of patients with NAFL and the comparison with the diet of healthy individuals. Although the results of these studies exhibited differences in some cases, overall, the patients with NAFL ingest the lower amount of cereals (13-15) and dairy products as compared to healthy individuals (16). In addition, the daily intake of red meat is more and fruits and vegetables is less in patients with fatty liver as compared to healthy individuals (13, 17).

Therefore, with unhealthy diets and increasing use of fast foods, the Iranian society is pushed towards a massive increase in weight and incidence of obesity. The continued habit would be detrimental to the society that would be posed with the complications of obesity in a high proportion of the population. Thus, improving the lifestyle of individuals with fatty liver in Iranian society can be the underlying measure

to prevent the spread of the disease. The present study was conducted to compare the lifestyle of patients with and without NAFL referred to the hospitals affiliated to the Tehran University of Medical Sciences. In this study, the nutrition of these individuals was compared.

MATERIALS AND METHODS

The present case-control study was conducted on 300 patients with and without NAFLD referred to the hospitals affiliated to the Tehran University of Medical Sciences. The case group was selected from outpatients and inpatients aged between 18 and 65 years referred to the ultrasound section of the selected hospitals and presented fatty liver disease. The control subjects were selected from those with a negative NAFLD. The inclusion criteria of the subjects were a willingness for participation, patients were 18–65-years-old, no alcohol consumption, and absence of hepatitis B, C, liver cancer, Cushing's syndrome, chronic pancreatitis, Wilson's disease, and thyroid disease. In this study, the convenience sampling method was used on individuals who were accessible to the scientist. The subjects were divided into case and control groups. A group matching was used to select the control group. The case and control groups were matched in terms of age, sex distribution, distribution of education, occupation, marital status, place of residence, tobacco use, and health insurance.

The minimum sample size was calculated as 84 using the following formula:

$$n = 2 \frac{(z_{\alpha/2} + z_{\beta})^2 \sigma^2}{(\mu_1 - \mu_2)^2}$$

Considering the possible attrition, 100 cases and 200 controls were selected. After approval from the Ethics Committee (IR.SBMU.RETECH.REC.1395.130), the maximum number of subjects was selected from Imam Hossein Hospital (82), Taleghani Hospital (70), Shohada Hospital, Tajrish Hospital (65), Imam Khomeini Hospital (42), and Shariati Hospital (41).

The data were collected using a demographic questionnaire, which included the individual characteristics of the subjects such as age, sex, height, nutrition over the past year,

occupational status, marital status, duration of NAFLD, and medications.

Statistical analysis: The data were analyzed using Statistical Package for the Social Sciences (SPSS, v. 19), descriptive statistics (mean, standard deviation, and frequency), and Man–Whitney tests (due to nonparametric data).

RESULTS

The study included 300 patients aged between 18 and 65. The cohort consisted of 204 males (82 patients with fatty liver and 122 without fatty liver) and 94 females (18 with fatty liver and 78 without fatty liver). The mean age of the subjects with fatty liver was 46.33±5.39 years and that of without fatty liver was 47.20±7.96 years. Most of the participants were married (84%), had a job without physical activity (69%), and did not administer any drugs (84.5%) (Table 1, Table 2).

The Mann–Whitney test showed that the non-affected (control) group ingested more fish, poultry, low-fat dairy products, cereals, whole grains, nuts, natural fruit juice, fruits, and vegetables over the past year as compared to the group of patients with fatty liver. On the other hand, the non-affected group had less red meat, eggs, high-fat dairy products, industrial juices, fried potatoes, chips, refined grains, snacks, garlic, coffee, salt, processed meats, sweets, and soft drinks as compared to the group of patients with fatty liver. However, the differences in nutrition between the two groups were statistically significant ($P < 0.05$).

DISCUSSION

The results of the present study showed that the mean body mass index (BMI) in the fatty liver group was 26.10±1.22 and that in the control 22.47±1.97, and the mean waist circumference of the fatty liver group was 98.83±7.28 and in the control group was 84.83±8.68. A majority of the research participants were married (84%), had a job without any physical activity (69%), and did not administer any medication (84.5%).

In the context of dietary habits, patients without fatty acid liver had less red meat, eggs, high-fat dairy products,

Table 1. Descriptive characteristics of patients participating in the study

Variable	Level	Healthy, N (%)	Fatty liver, N (%)	P
Gender	Male	122 (61)	82 (82)	0.001
	Female	78 (39)	18 (18)	
Marital status	Single	34 (17)	5 (5)	0.001
	Married	138 (69)	84 (84)	
	Divorced	20 (10)	6 (6)	
	Died	8 (4)	5 (5)	
Medication use	Yes	31 (15.5)	73 (73)	0.001
	No	169 (84.5)	27 (27)	
Job	With physical activity	127 (63.5)	31 (31)	0.001
	Without physical activity	73 (36.5)	69 (69)	

Table 2. Comparison of food intake during last year in patients with and without NAFLD among the case and control groups

Variable	Group	Mean±SD	P value
Red meat	Healthy	1.78±0.66	0.001
	Fatty liver	2.59±0.76	
Fish	Healthy	2.39±0.67	0.001
	Fatty liver	1.44±1.10	
Poultry	Healthy	2.67±0.73	0.001
	Fatty liver	1.29±0.70	
Egg	Healthy	1.32±0.98	0.001
	Fatty liver	2.44±1.08	
Low-fat dairy	Healthy	3.19±1.28	0.001
	Fatty liver	2.33±3.07	
High-fat dairy	Healthy	1.20±0.82	0.001
	Fatty liver	2.46±1.14	
Unhealthy oil	Healthy	1.41±1.14	0.15
	Fatty liver	1.22±0.94	
Healthy oil	Healthy	3.36±1.33	0.06
	Fatty liver	3.43±4.23	
Industrial juice	Healthy	0.88±0.90	0.16
	Fatty liver	1.04±0.94	
Cereals	Healthy	2.14±1.21	0.02
	Fatty liver	1.80±1.17	
Potato	Healthy	1.97±1.82	0.001
	Fatty liver	2.92±1.07	
Fried potato	Healthy	0.43±0.61	0.001
	Fatty liver	2.30±1.09	
Tea	Healthy	4.09±3.02	0.25
	Fatty liver	4.10±1.43	
Whole grains	Healthy	4.00±3.83	0.001
	Fatty liver	3.00±1.53	
Refined grains	Healthy	1.45±0.88	0.001
	Fatty liver	2.36±1.25	
Snack	Healthy	1.35±0.75	0.001
	Fatty liver	1.92±0.97	
Nuts	Healthy	2.89±1.33	0.001
	Fatty liver	2.12±1.24	
Dried fruit	Healthy	2.39±1.21	0.001
	Fatty liver	2.77±1.15	
Pickles	Healthy	1.98±1.16	0.14
	Fatty liver	2.22±1.17	
Coffee	Healthy	1.45±0.97	0.001
	Fatty liver	2.12±2.04	
Salt	Healthy	1.87±1.36	0.001
	Fatty liver	3.05±1.49	
Viscose	Healthy	0.705±0.707	0.001
	Fatty liver	2.34±1.26	

(Contd...)

Table 2. (Continued)

Variable	Group	Mean±SD	P value
Natural juice	Healthy	4.27±1.48	0.001
	Fatty liver	2.32±1.22	
Sweets and cola	Healthy	0.865±0.866	0.001
	Fatty liver	2.39±0.95	
Fruit and vegetable	Healthy	4.27±1.45	0.001
	Fatty liver	3.09±1.41	

industrial juices, potatoes, fried potatoes, refined grains, snacks, coffee, salt, processed meat, dried fruits, and cola than patients with fatty liver. Moreover, the consumption of fish, poultry, low-fat dairy products, cereals, whole grains, nuts, natural fruit juices, fruits, and vegetables was lower in patients with NAFL than those without the disease.

The study by Kanaki et al. compared the risk factors for developing fatty liver and found that the mean daily and weekly consumption of red meat and high-fat dairy products was lower in patients with NAFLD (18), and healthy individuals consumed more fruits and vegetables than the patients with fatty liver. Also, Pakzad et al. demonstrated that the consumption of fruits, vegetables, and fish was higher than red meat in healthy individuals (19). The results of the study conducted by Thoma et al. indicated that healthy individuals were more likely to use white meat and healthy drinks and consume less red meat per week as compared to NAFLD patients (20).

Shi et al. reviewed the prevalence of NAFLD and the association with lifestyle habits among University students and staff. The study concluded that the consumption of rice, fruits, vegetables, red meat, eggs, fish, full-fat milk, cereals, and sweets was high in people with NAFL (21). Also, in a study by Georgoulis et al. on the effect of grains and non-alcoholic liver disease, people with NAFL were found to consume high amounts of grains during the day and week (22) along with high fat intake during the week. Furthermore, Dehghan et al. compared the nutritional behaviors and BMI in patients with NAFL to patients without NAFL. The results demonstrated that the consumption of high-fat dairy products was significantly higher in NAFL than in healthy individuals (23).

The study by Carvalhana et al. found that the nutritional value of fat, cholesterol, saturated fat, and sugar was one of the main causes of fatty liver. In addition, patients with fatty liver use high-fat diet as compared to healthy individuals. Thus, the results of the study confirmed the nutritional findings of the present study (24). Interestingly, the study by Guo et al. examined the lifestyle, nutritional habits, and factors affecting overweight and obesity in students, and showed that individuals with excessive obesity eat less breakfast than normal people and consumes fruits less than four times during the week. On the other hand, the consumption of high-fat foods and fast-food was more than 4 times during the week (25). In various studies, the consumption of red meat and its products, fats, oils, sugars, and sweets in patients with NAFL as compared to healthy group was

high than the recommended limits, while the consumption of whole grains, fruits, and vegetables in these patients was low (21, 26, 27).

The consumption of fruits and vegetables exert a protective effect on the prevention and development of fatty liver due to the high fiber content, phytochemicals, and antioxidant compounds. Phytochemicals and antioxidants are anti-inflammatory and prevent the progression of hepatic steatosis. In addition, fiber plays a role in maintaining the levels of blood glucose, insulin, and free fatty acids in patients with NAFL (28).

CONCLUSION

Non-affected patients primarily ingested low-fat and low-cholesterol diet, while people with fatty liver had a high-fat diet. Regarding the high prevalence of NAFL, altered lifestyle and the implementation of educational interventions to increase awareness and improve the attitude of individuals, and appropriate studies should be conducted to prevent and treat the fatty liver.

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AUTHOR CONTRIBUTIONS

MA and SZ participated in research design, the writing of the paper, and the performance of the research. ZB and MN contributed to the study design, preparation of the manuscript and final revision. TE acted as consultant of study. All authors read and approved the paper.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICAL STANDARDS

Approval from the Ethics Committee (IR.SBMU.RETECH.REC.1395.130)

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