Original Article

Nutritional problems of liver transplant candidates

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Summary. *Aim:* The study aims to evaluate the nutritional problems of the patients on the waiting list for liver transplantation due to the high risk. *Methods:* The study evaluates the nutritional status of 102 liver transplant candidates including 41 women and 61 men followed by the liver transplantation team of the Hospital in Ankara. Data collected was evaluated using SPSS 21.0 statistical software. Continuous variables were expressed as mean ± SD and categorical variables as percentages. *Results:* The average weight of the patients on the list of liver transplant candidates was 78.5±15.5 kg. According to BMI, 37.6% of the patients were found to be overweight and 37.6% were obese; and according to SGA, 28.4% of the patients (29 persons) were found to have moderate PEM. 76.5% of the patients skip meals; and 53.9 skip meals because they do not want to eat. 12.7% do not eat at all and 41.2% eat less than usual when they are sad or tired. 75.5% eat salty/less salty foods. 46.1% received training in diet and 48% follow their diet plans. *Conclusion:* Obesity may also threaten all patients with chronic liver disease as much as malnutrition. Thus, as one of the variables affecting the morbidity and mortality in patients on the waiting list for liver transplantation, nutritional status should be well followed up and necessary changes should be made.

Key words: liver transplantation, nutritional status

Introduction

Cirrhosis is an end-stage chronic liver disease, and the damage to the hepatocytes decreases the function of the liver, leading to a variety of nutritional metabolic disorders. Therefore, protein energy malnutrition (PEM) is frequently seen in patients with cirrhosis (1-3).

Several factors are present in the development of malnutrition in cirrhotic. Inadequate oral ingestion resulting from anorexia, dysgeusia, early satiety, nauseas and vomits associated with hepatopathy, use of drugs and their adverse effects (4).

Malnutrition is a relevant factor when determining the progress of hepatic disease, as it affects the storage of nutrients, contributes to hypoalbuminemia resulting from impaired hepatic synthesis and according to characteristics of this disease state, intensifies the hydroelectrolytic unbalance determined by renal alterations (5).

Roongpisunthinpong et al (6) suggest that PEM prevalence in chronic hepatic disease is between 10% and 100%, it is dependent on its severity of disease. However, malnutrition is associated with high morbidity and mortality, influencing the short and long term patient survival. Malnutrition can aggravate patient while waiting on the waiting list (7).

Currently, the lifestyles of people in urban areas of several Asian countries are changing due to westernization and motorization, resulting in excessive food intake, decreased intensity of daily activities, and a lack of exercise. These changes may lead to obesity, metabolic syndrome, and lifestyle diseases. Is there a possibility that this lifestyle transition (over-nourishment and decline in the intensity of daily activities) has an effect on the nutrition of cirrhosis. In 2006, a study reported that body mass index (BMI) in patients with cirrhosis was almost the same as those of the same

age group in the normal Japanese population(8). The combination of over-nutrition and obesity in cirrhosis patients also indicates the possibility of unimpaired pathogenesis. These findings suggest that high calorie and protein intake (i.e., old dietary interventions of cirrhosis) promotes obesity, fatty liver, and hepatic carcinogenesis. Almost all subjects in Japanese reports were hospitalized having decompensated cirrhosis with hepatic failure (8).

The subjective global assessment proposed by Detsky et al (9) has been considered a good approach for subjective assessment of patients with liver disease (10), but water retention complicates its applicability since the estimated weight loss, which is part of this assessment, becomes impaired (11).

In these patients, not only malnutrition but also is often encountered with weight control. We think that that's why obesity should be considered as well. Given the high prevalence of malnutrition and its relationship with morbidity and mortality in patients with liver cirrhosis as well as the absence of a gold-standard method for nutritional evaluation of these patients, we conducted the present study with the purpose to evaluate the nutritional status and malnutrition status with SGA and BKI in patients with liver cirrhosis enrolled for liver transplantation. This preventive measure applies primarily to patients on the liver transplant list, who will thus have a better quality of life until the time of the transplant. Nutritional status of patients in the waiting list for liver transplant must be assessed due to the many risk factors associated with nutritional deficiencies.

Methods

Studies time: October 2011-May 2012 were made between.

The research population, sampling methods: Turkey Training and Research Hospital Gastroenterology Clinic followed by liver transplantation team total of 102 patients wait for liver transplant, 41 (40.2%) female 61(59.8%) male patients aged between 18 to 60 years were included all patients who were followed. Patients under the age of 18 years were not included. The patients participated in interviews for clinical nutritional assessment (anthropometric, subjective) and SGA evaluation.

Ethics: All patients were informed in detail and documented by an informed consent about the study. Permission was taken from Transplantasyon Study Group of Hospital and Hospital Educational Planning (Do you have a ethics decision number).

Anthropometry: Weight was measured using a Filizola 100 g resolution scale and height with a wall-mounted stadiometer. The body mass index (BMI (BMI=weight/height^2)) was calculated, were considered for the nutritional state classification (12). All subjects underwent anthropometric measurements of current weight (CW), height (H), Body Mass Index for cirrhotic patients (BMI) as proposed by Campillo et al (13), which is also recommended by ESPEN. Optimal BMI cut-off values were 22, 23 and 25 kg/m^2 in no ascite, mild and tense ascites patients, respectively. BMI is a reliable parameter to detect malnutrition in cirrhotic patients with the above mentioned cut-offs. Peripheral oedema and removal of ascites do not affect its diagnostic performance (13). Patients waist circumference measurements were also taken. Waist circumference 102 cm in men, 88 cm in women with abdominal obesity is defined (14).

Subjective Global Assessment: All patients on the waiting list for liver transplantation were nutritionally assessed by the Subjective Global Assessment (SGA). The subjective global assessment (SGA) was performed following the protocol of Detsky et al. It analyzed history data of ponderal loss, reduced daily caloric ingestion, gastrointestinal symptoms, functional capacity and physical signs of malnutrition (reduction of subcutaneous tissue and/or muscular mass, edema, ascites). The patients were classified as: well nourished (A), with moderate malnutrition (B) and severe malnutrition (C), according to the method scores.

Statistical analysis

A descriptive analysis was performed through mean values and standard deviation for continuous variables and relative frequency for categorical variables. The analyses were performed using SPSS (Statistical Package for the Social Sciences) version 21.0.

Results

The average age, height and weight of 102 patients including 41 women (40.2%) and 61 men (59.8%) on the list of liver transplant candidates were 46.78±11.67 years, 1.66±0.92 m, and 78.35±15.53 kg, respectively. The average BMI was 28.5±5.22 kg/m^2. The average waist circumference was (106.63±11.72) 105.73±11.16 for women and 107.23±12.13 for men.

28.4% of the patients (29 persons) were found to have moderate PEM when evaluated according to Subjective Global Assessment (SGA). When evaluated according to BMI, 24.8% of the patients (25 persons) were found to be normal, 37.6% (38 persons) were overweight, and 37.6% (38 persons) obese (Table 1).

24.5% of the patients never stayed in hospital, while 16.7% were hospitalized for treatment at least 4 times and more (up to 15 times). 41.2% of the patients go for a check-up regularly every month or two months. 54.9% of the patients do not smoke at all, while 20.6% drink alcohol. Almost three-quarters of the patients skip meals. Because they do not want to eat, forget or have no time to eat. 45.1% of those who skip meals skip lunch. When tired or sad, 12.7% of the patients do not eat at all and 41.2% eat less than usual. 75.5% of the patients eat salty/less salty foods. 46.1% of the patients received training in diet; however, 52% do not follow their diet plan (Table 2).

Table 1. SGA, BMI and waist circumference findings of patients with liver transplant candidates patients

Status	N(=102)	%
SGA		
A	73	71.6
B	29	28.4
BMI (kg/m^2)		
Normal (18.50–24.99)	25	24.5
Overweight (25.00–29.99)	39	38.2
Obese I (30.00–34.99)	22	21.6
Obese II (35.00–39.99)	13	12.8
Obese II (>40.00)	3	2.9
Waist circumference (cm)		
≥102(Male)	50	81.9
≥88(Female)	39	95.1

Table 2. Some of the findings in patients with liver transplant candidates

	N(=102)	%
Number of hospitalizations		
None	25	24.5
1	24	23.5
2	23	22.6
3	13	12.7
4and ↑	17	16.7
Frequency of go to control		
Every month	24	23.5
Two months	18	17.7
6 months	30	29.4
According to Doctor	30	29.4
Smoking status		
Does not smoke	56	54.9
Day 1-10	20	19.6
Day 11-20	10	9.8
Over 20 days	16	15.7
Alcohol drinking		
Yes	21	20.6
No	81	79.4
Skipping meals		
Do not skip meals	24	23.5
Morning meals	28	27.5
Noon meals	46	45.1
Evening or meals	4	3.9
Cause of skipping meals		
For weight loss	2	2.0
Can not wanted	55	53.9
Forget-opportunity ..etc	45	44.2
The effect of eat being sorry, tired..		
Do not ever eat	13	12.7
Less than usual	42	41.2
More than ever	9	8.8
does not change	38	37.3
Salt consumption		
Yes	77	75.5
No	25	24.5
Dietary education		
Yes	47	46.1
No	55	53.9
Adaptation to the diet		
Yes	49	48.0
No	53	52.0

Considering the clinical signs of liver transplant candidates, 57.8% have problems associated with oedema-ascites, 51.0% with pain, 37.3% with nausea-vomiting, 44.1% with constipation, and 23.5% with diarrhea; and 62.7% reported not feeling good using expressions such as tired, weary, and tense. 45.1% have headaches, 32.4% have diabetes, 27.5% suffer from stomach problems such as ulcer and gastritis, 22.5% have hypertension, 24.5% have hypotension, 19.6% suffer from gall bladder problems, 6.9% have kidney failure or stones, etc., and 5.9% have other health problems associated with lung and 2.9% with hearth.

Discussion

The average weight and BMI of 102 patients followed on the list of liver transplant candidates were 78.35±15.53 and 28.52±5.22. There is no patient with a BMI under 18.5; however, 7 persons (6.9%) have a BMI under 20.5 (at risk of malnutrition). The probability of ascites and/or oedema in these patients may have influenced the finding of malnutrition according to BMI. However, when evaluated according to SGA, 28.4% were found to have moderate PEM. SGA is considered to be practical and usable, since it is a method which enables to evaluate food intake, physical and functional capacity, weight loss, and the presence of ascites or oedema according to the qualitative and quantitative variables. However, it must be evaluated by experts and very careful persons. Due to the harmful effects of liver failure on other organ systems, severe or moderate malnutrition develop often in transplantation candidates. The prevalence of malnutrition is high in patients with chronic liver disease (6, 15, 16). Patients with liver cirrhosis receiving outpatient treatment (17), hospital inpatients (18) and patients undergoing liver transplantation (19, 20, 21) have varying degrees of malnutrition.

Gottschall et al. (11) estimated that malnutrition was 38%in patients with cirrhosis according to SGA while Figueiredo et al. (22) estimated it to be higher than 60%. Ferreira et al. (23) found the malnutrition rate to be 74.7% in patients waiting for liver transplantation. In this study, the results (B level of malnutrition in 28.4% of patients according to SGA) were a little less than the aforesaid studies. It may result from the outpatient status of the patients and social differences.

As one of the most important indicators of obesity, BMI was higher than 24.99 in 75.5% of the patients and 37.6% of them had a BMI over 30. It indicates that obesity as well as malnutrition is a major problem. Campillo et al. (13) evaluated BMI cut-off values as 22, 23 and 25 kg/m^2 in patients with no ascites, with mild ascites, and with tense ascites, respectively. BMI was reported to be a reliable parameter to detect malnutrition in cirrhotic patients with the above mentioned cut-offs and peripheral oedema and removal of ascites do not affect its diagnostic performance (13). Çelebi et al. reported 39.5% were overweight, 18.4% were obese, and 26.5% had waist circumference above normal in the population of non-alcoholic fatty liver disease; and these findings are close to our findings (24). Singal et al. classified 68% as overweight/ obese with an average BMI of 28±6 in a similar group (25).

Central obesity (or visceral adiposity) is the result of a disorder in the transportation of fatty acids into liver (26) and closely associated with the other elements of metabolic syndrome together with fatty liver. Visceral adiposity can be measured with conventional anthropometric methods such as waist-to-thigh ratio (WTR) or waist circumference. The majority of patients (95.1% of male patients, 81.9% of female patients) had waist circumference above the required values (i.e. they are obese). It is known that the presence of ascites and oedema in these patients may mislead us in assessing waist circumference; however, regular waist circumference measurements may be an indication of the presence of ascites as well as abdominal adiposity. 55 transplantation candidates (53.9%) were found to have ascites and oedema. Even if these 55 patients are excluded from 89 patients (87.3%) with waist circumference above normal, it is safe to say that 32 patients (31.4%) are still obese according to BMI. In this way, regular waist circumference in liver patients can provide us with a clue about acid deposition in these patients.

Severely obese patients had fatty liver over 75%, 24% of them had non-alcoholic steato hepatitis (NASH), 3-11% developed cirrhosis and moreover, obesity independently from diabetes and age was dem-

onstrated to be associated with the severity of fibrosis. It suggests the importance of weight control in these patients in primary prevention (27). Complications such as metabolic syndrome, obesity and fatty liver are risk factors for the fibrillation of the liver (28) and cancer (29) in patients with chronic liver disease. These complications are associated with increased risk of carcinoma mortality (30). Patients with obesity or fatty liver may prevent cancer progression through a proper diet and suitable lifestyle. However, malnutrition in patients with cirrhosis leads to deterioration of energy metabolism and decreased protein synthesis due to liver failure. Protein malnutrition may cause a decrease in skeletal muscle mass in patients with cirrhosis (28-30). Thus, instead of very restricted diets for weight control in patients, diets enabling slower weight loss should be administered in such patients (evaluating both nutritional status and ascites/oedema).

Those patients who are candidates for transplantation often had to be hospitalized for treatment. About 3 of every four patients were hospitalized for treatment at least once; however, 24.5% were not hospitalized for treatment. 16.7% were hospitalized for treatment at least 4 times and more (up to 15 times). About 1 of every four patients went for a check-up regularly every month. As reported by Singal et al. (31), malnutrition, poor quality of life, risk of infection, frequent hospitalization, complications, and mortality are a cause of of high economic burden for patients with alcoholic liver disease or cirrhosis after liver transplantation. In relation to the etiology and degree of liver damage, malnutrition was demonstrated to more severe in patients with alcoholic cirrhosis than in non-alcoholic cirrhosis (6, 17). Hepatocellular carcinoma or liver failure more rarely develop in patients with advanced cirrhosis (32). Incidence of NASH in obese people is 6 times more than normal-weight people (33); there is also data indicating that obesity creates a greater risk for fatty liver than alcohol (34).

We cannot compare these studies with the values of our population because alcohol consumption is not high in our society unlike in western society due to beliefs. Although the aim of the this study is not to determine metabolic syndrome , the diabetes rate of 32.4% in patients and the hypertension rate of 25.5% as well as high waist circumference lead us to think that these patients had signs of metabolic syndrome. In this study, the rate of alcohol consumption was low as being 20.6% due to socio-cultural reasons, awareness of the harm caused by alcohol or concealment of alcohol consumption. It shows that the data related to malnutrition or obesity is reliable on the basis of the problems in the patients.

Sodium and fluid restriction is required in cases of oedema and ascites and widely recommended (35). However, since very strict salt restriction changes the flavour of food, it may suppress food intake. It may consequently worsen the status of these malnourished patients. In the present study, approximately one of four patients could eat salt-free diet, while 42.2% reported that they reduced the amount of salt but could not eat all salt-free diet. However, the rate of the patients with oedema and ascites who had to eat salt-free diet was 53.9%. The patients who ate salt-free diet ate salty cheese and bread almost every day because they could not access or afford salt-free foods. Among 102 patients, 7 did not eat pickles, 1 did not eat cheese, 2 did not drink coke or soda, 3 did not eat salty foods, 1 di not eat sausage, 1 did not drink mineral water, and 2 did not eat dried nuts because their diet did not recommend foods high in salt (dietary salt restriction). It indicates that the patients do not have enough information about salt and pay enough attention to their diet.

Slow and continuous weight loss through proper nutrition and regular exercise is still the most effective treatment method in obese patients. In the present study, individuals were asked about doing sport, but none answered yes. Their reasons for not doing sport were feeling weary and tired. Not doing sports and undernourishment due to fatigue again constitute a vicious cycle that leads to nutritional deficiencies in patients. Sedentary lifestyle also leads to obesity, metabolic syndrome and constipation problems in some patients.

Ascites causes breathing difficulties in patients and this is what probably reduces physical activity. Decreased physical activity observed in the patients on the waiting list for liver transplantation is associated with serious liver disease and probably with loss of muscle mass as well as decreased quality of life (36).

Headache/migraine, diabetes, ulcers, stomach problems such as gastritis, hypertension, hypoten-

sion, gall bladder disease, kidney disease/failure, etc. and other health problems related to lung and heart in most of the patients as well as ascites in 53.9% and problems related to nausea-vomiting, constipation, and diarrhoea in 31.4% make patients' diet more important. All these problems are the factors affecting patients' eating. This creates a vicious cycle by influencing adequate and balanced nutrition.

Conclusion

Obesity may also threaten all patients with chronic liver disease as much as malnutrition. SGA, adjusted BMI and waist circumference measurements can be used in the evaluation of nutrition-related problems (malnutrition/obesity) in such patients. As an easy, practical and inexpensive method, waist circumference measurement can be generalized as part of physical examination. Thus, as one of the variables affecting the morbidity and mortality in patients on the waiting list for liver transplantation, nutritional status should be well followed up, necessary changes should be made, and patients should be informed about their diet in detail.

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