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Dietary Patterns in Egyptian Patients with Chronic Hepatitis C Related Liver Disease: A Cross-Sectional Study

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Abstract

Introduction: Over the past years, the role of nutrition as one of the most important factors that can influence overall mortality and morbidity in end stage liver disease (ESLD) has been well understood and appreciated, Our study aimed at assessment the dietary intake of the Egyptian cirrhotic patients (due to hepatitis C virus).

Patients and methods: Ninety patients were included in the study were divided into three groups according their liver condition according to Child Pugh scoring system (thirty patients of each child class) and all were subjected to careful history (including medical dietary advice, appetite assessment) and thorough dietary history (including 24 hour recall and food frequency).

Results: We found Predominance of unsafe intake in calories, calcium, magnesium, potassium and zinc, which was more overt in advanced patients. While predominance of over consumption in protein, sodium, iron, selenium and copper, more in Child A group patients. Using food frequency method, we found that with progress of liver disease, there are fewer variations with more restrictions and limitations regarding the intake.

Conclusion: Dietary assessment is an important part of the assessment of liver disease patients and offers helpful nutrition interventions to ensure satisfactory nutrient intake and improve the overall clinical outcome of the patient.

Keywords: Dietary intake; Nutritional assessment; Chronic liver disease

Introduction

Malnutrition occurs when diet does not provide adequate calories and protein to maintain nutritional status or the body is unable to fully absorb or utilize food eaten secondary to liver disease. Despite the obvious relevance, clinical research in this field is limited and malnutrition is frequently underdiagnosed in clinical practice [1]. Malnutrition is by far considered one of the most important prognostic factors in liver cirrhosis and should alert clinicians to the same extent as the presence of other common complications of cirrhosis such as hepatic encephalopathy or ascites [2]. Unfortunately, to date there have been few studies specifically addressing the presence of malnutrition in patients with chronic viral hepatitis before the onset of cirrhosis. However, recent data suggest that patients with chronic hepatitis C (CHC) are nutritionally impaired even in the absence of cirrhosis [3].

A variety of mechanisms are considered to contribute to malnutrition in cirrhosis: poor dietary intake, mal-absorption and increased intestinal protein losses, low protein synthesis, disturbances in substrate utilization, and hyper metabolism, Drug induced losses (Neomycin, lactulose, and diuretics). Many of these are not fully understood [4]. Unfortunately, we should keep in mind that too many physicians tend to prescribe a low protein diet in order to avoid hepatic encephalopathy leading to poorer nutritional status. Other iatrogenic causes for protein and caloric loss include the multiple hospitalizations which may lead to loss of regular meals for reasons of pending examinations and procedures [5].

It is important for the nutrition professional to review a patient's nutrition history to assess intake of energy, protein, macro and micronutrients. It is valuable to note factors contributing to diet history such as past dietary restrictions, appetite, satiety levels, taste changes, socioeconomic status, fad diets, supplement use, ethnic or religious preferences, and food intolerances or allergies. Although all have limitations, the patient's oral intake history may be obtained using the 24-hour diet recall, food frequency questionnaire, calorie counts, or food diary. Nutrition risk can be predicted using the Subjective Global Assessment (SGA) scale, which is a score based on medical diagnoses, weight changes, intake, gastrointestinal (GI) symptoms, and function capacity and physical signs of malnutrition. This low-cost screening method is quick and has been shown to predict outcomes after liver transplant; however, it is important to note that this method has been shown to underestimate the presence of malnutrition in cirrhosis, as it relies on subjective information, and is not predictive of outcomes in cirrhosis [6]. This study tries to assess for the first time the detailed dietary intake of chronic liver disease Egyptian patients with referral to their actual intake of macro and micronutrients in correlation to both nutritional and clinical status.

Patients and Methods

This study is a cross sectional study conducted in Tropical Medicine Department, Ain Shams University hospitals and included ninety Egyptian patients with HCV related chronic liver disease (diagnosed on clinical, laboratory and ultrasonography basis), divided into three groups according to Child Pugh scoring system to classify their liver cirrhosis stage into three equal groups (n=30 in each) as following: early (Child A), moderate (Child B) and severe liver cirrhosis (Child

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C). Patients included in the three groups were matched regarding age and sex. Patients with one or more of the following criteria were excluded from the study: HCC patients or any other malignancies. Any associated liver disease other than CHC, Those with any other chronic inflammatory or debilitating diseases in addition to Patients with previous surgeries of the gastrointestinal tract.

All included patients were subjected to the following after signing a written consent:

Comprehensive history taking: With special stress on medical dietary advice through asking the patient to recall his physician's dietary recommendations about food elements restrictions, meal frequency, and weight assessment in each visit, assessing the indications of these recommendations in reference to the current international guidelines.

Appetite score: Simplified Nutritional Appetite Questionnaire (SNAQ) by Wilson et al.: SNAQ score ≤ 14 indicates significant risk of at least 5% weight loss within six months [7].

Subjective Global Assessment (SGA): SGA is a score based on medical diagnosis, weight changes, intake, gastrointestinal (GI) symptoms, and function capacity and physical signs of malnutrition, the patients were classified as well nourished (grade A), moderately malnourished or suspected of being malnourished (grade B), or severely malnourished (grade C) [8].

Dietary assessment: A- 24 hours recall method: obtaining accurate amounts of foods and beverages consumed by patients in the three days preceding data collection, and the data from the 3 days dietary recall were used to arrive at estimates of daily nutrient intake from standard recipes (in 24 hours), using published food composition databases [9].

B-The Food Frequency Questionnaire (FFQ): asking the participants to report the frequency of consumption and portion size of approximately 125 line items over a defined period of time (e.g. the last month; the last three months), using a form accredited by The Egyptian Institute of Nutrition containing food items commonly consumed by the Egyptians [10]. All methods of assessment were done by the same trained personnel.

Statistical analysis of results (Data management)

Statistical analysis was done through statistical package for social science (SPSS) software version 13.0.

1. **Descriptive Data:** Data were expressed as number and percentage for categorized data, mean and SD for parametric data and mean, SD and median for laboratory variables.

2. **Analytical Data:**

- Chi-square test (x^2) (test of significance in qualitative data).
- Paired test: for comparing between 2 dependent means.
- Mann Whitney U test: for two-group comparisons in non-parametric data.
- Ranked Spearman correlation test.

Significance was evaluated as follows:

- P-value: > 0.05 (non-significant).
- P-value: < 0.05 (significant).
- P-value: < 0.01 (highly significant).

Results

Ninety patients were included in this study, with 48 males, the mean of their ages was 46.6 ± 11.9, 55.67 ± 7.86, 52.2 ± 8.1 in Child A, B, C respectively with no significant difference, 27 of all patients were diabetics and 24 were hypertensive.

Regarding appetite assessment

Appetite score ≤ 14 indicates significant risk of at least 5% weight loss within six months. the number of patients with score > or = 14 increases with progress of liver disease, they constitute 36,7%, 73.3% and 76.7% of Child A group, Child B group and Child C group respectively. So loss of appetite correlates with the progression of liver disease and contributes to malnutrition (Table 1).

As regard the nutritional consultation

There was no significant association between weight assessment or meal frequency advice and progress of liver disease assessed by Child Pugh score, but concern about dietary advice increased with progress of liver disease as 50% of Child C patients received this advice from their doctors while only 6.7% of Child A patients received this type of advice. So while the liver disease progresses doctors only pay attention only for giving their patients some dietary advices (some of them may be not truly indicated) neglecting the nutritional assessment as a routine part of the care these particular group of patients should receive, on the other hand in the early stages of liver cirrhosis the nutritional part of management is neglected or unsatisfactory (Figure 1).

The percentage of severe malnutrition increases with the progression of liver disease as it was 0%, 10% and 36.7% in Child A, B and C respectively (Figure 1).

We found that the most frequent unsafe consumptions among all patients was in potassium and magnesium the total caloric intake: 82.3%, 76.6% and 72.2% respectively while the over consumption pattern was met in protein intake and sodium: 36.7% and 31.1% respectively (Table 2).

You can notice excess intake regarding selenium and iron (62.2% and 25.6%, respectively) with the highest distribution in the Child B class (moderate liver cirrhosis), the most frequent unsafe intake was noted in the zinc consumption (25.6%) more prominent in late stages (Child C) group in percentage of 40% (Table 3).

Regarding dietary intake of vitamins we found that vitamin A, C, B1 and B2 were unsafely consumed in 71.1%, 43.3%, 40% and 37.8% of all patients respectively, the distribution of unsafe consumption was the highest among late cirrhosis regarding all mentioned nutrients (Table 4).

Predominance of unsafe intake was noted in calories, calcium, magnesium, potassium and zinc. This unsafe intake was more in Child C group patients. Predominance of unsafe intake was also noted in vitamins, with nearly no significant difference between Child groups. Predominance of over consumption was noted in protein, sodium, iron, selenium and copper. This over consumption was more in Child A group patients. There was no significant relationship between dietary adequacy and Child Pugh score except in protein intake.

Table 5 shows food frequency results in all studied patients and are divided into two divisions (less than three times per week and more than three times per week). Food items that show less frequent intake by studied patients (less than three times per week) are cereals, legumes, vegetables, fruits and meat products, while Food items that

		Child A		Child B		Child C		P-value
		No.	%	No.	%	No.	%	
Salt restriction advice	Yes	16	53.3%	29	96.7%	28	93.3%	0.000*
	No	14	46.7%	1	3.3%	2	6.7%	
Advice judgment	Good	11	36.7%	27	90%	28	93.3. %	0.003#
	Bad	5	16.7%	2	6.7%	0	0.0%	
Total proteins restriction	Yes	2	6.70%	8	26.70%	23	76.70%	0.000*
	No	28	93.30%	22	73.30%	7	23.30%	
Advice judgment	Good	0	0.00%	2	6.7%	19	63.3%	0.002*
	Bad	2	6.7%	6	20%	4	13.3%	
meat restriction	Yes	5	16.7%	17	56.7%	23	76.7%	0.000*
	No	25	83.3%	13	43.3%	7	23.3%	
Advice judgment	Good	0	0.0%	2	6.7%	19	63.3%	0.000*
	Bad	5	16.7%	15	50%	4	13.3%	
Diary protein restriction	Yes	1	3.30%	1	3.30%	4	13.30%	0.200
	No	29	96.70%	29	96.70%	26	86.70%	
Advice judgment	Bad	1	3.3%	1	3.3%	4	13.3 %	NS
Carbohydrates restriction	Yes	6	20.0%	12	40.0%	8	26.7%	0.22
	No	24	80.0%	18	60.0%	22	73.3%	
Advice judgment	Bad	6	20%	10	33.3%	8	26.7%	NS
Fat restriction	Yes	13	43.30%	21	70.00%	21	70.00%	0.05#
	No	17	56.70%	9	30.00%	9	30.00%	
Advice judgment	Good	13	43.30%	21	70.00%	21	70.00%	NS

*highly significant; #significant

Table 1: Comparison between the three studied groups regarding food elements restriction by their doctors (assessment of dietary advice).

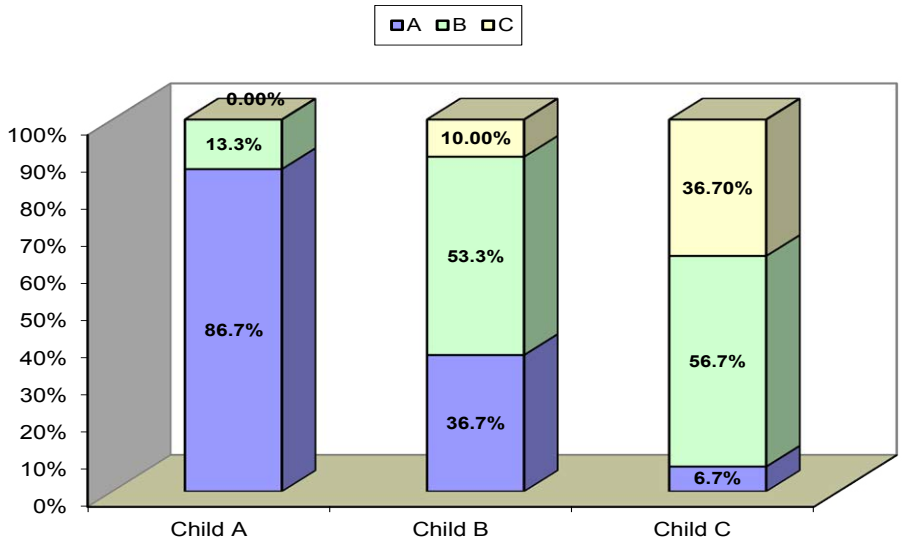

Figure 1: Malnourished patients by SGA and progress of liver disease by Child Pugh score.

show more frequent intake by studied patients (more than three times per week) are milk products, fat, spicy, and beverages (Table 6).

Discussion

Protein calorie malnutrition (PCM) occurs in at least 50% and up to 90% of patients with liver cirrhosis and progresses as liver function deteriorates, and itself leads to a poor prognosis for the hepatic patient. However it is commonly undiagnosed due to the complications of liver disease such as edema and ascites, which make weight change detection more difficult in this patient population [11]. Even if PCM is diagnosed in a patient, its importance is often underestimated by the physician and it is not considered a medical problem in need of immediate attention. However, it is important to note that malnutrition is an independent risk factor for predicting clinical outcomes in patients with liver disease and is associated with an increased risk of morbidity, mortality [12].

This study was a cross sectional study conducted on 90 Egyptian patients with chronic hepatitis (C) virus infection. Patients were divided into three groups (A, B, C) according to Child Pugh score, thirty in each group. We found that anorexia contributes in the malnutrition more predominately in advanced cases (62.2%) and may have limited role in early and mild cases, this matches with similar results by [13].

We tried in our study to spot the light on iatrogenic causes of malnutrition for example; too many physicians tend to prescribe a low protein diet in order to avoid hepatic encephalopathy leading to poorer nutritional status. Other iatrogenic causes for protein and caloric loss include the multiple hospitalizations which may lead to loss

Group								
Total		C		B		A		
%	NO	%	NO	%	NO	%	NO	Nutrient Calories
72.2	65	80	24	76.6	23	60	18	< 50%
15.6	14	13.3	4	16.7	5	16.7	5	50-75%
11.1	10	6.7	2	6.7	2	20	6	75-120%
11.1	1	0	0	0	0	3.3	1	≤ 120%
P = NS								
								Protein
18.9	17	30.4	10	20	6	3.3	1	< 50%
20	18	20	6	26.7	8	13.4	4	50-75%
24.4	22	23.3	7	10	3	40	12	75-120%
36.7	33	23.3	7	43.3	13	43.3	13	≤ 120%
P = 0.013 *								
								Calcium
66.3	59	65.5	19	60	18	73.3	22	< 50%
18	16	13.8	4	23.3	7	16.7	5	50-75%
14.6	13	17.2	5	16.7	5	10	3	75-120%
1.1	1	3.5	1	0	0	0	0	≤ 120%
P = NS								
								Magnesium
76.6	69	80	24	76.7	23	73.4	22	< 50%
15.6	14	16.7	5	20	6	10	3	50-75%
5.6	5	3.3	1	0	0	13.3	4	75-120%
2.2	2	0	0	3.3	1	3.3	1	≤ 120%
P = NS								
82.3	74	86.7	26	80	24	80	24	Potassium
13.3	12	10	3	13.3	4	16.7	5	< 50%
3.3	3	3.3	1	6.7	2	0	0	50-75%
1.1	1	0	0	0	0	3.3	1	75-120%
								≤ 120%
P = NS								
								Sodium
24.4	22	36.7	11	20	6	16.7	5	< 50%
16.7	15	13.3	4	13.3	4	23.3	7	50-75%
27.8	25	23.3	7	36.7	11	23.3	7	75-120%
31.1	28	26.7	8	30	9	36.7	11	≤ 120%
P = NS								
According to intake recommended for hepatic patients by ESPEN guidelines: < 50% unsafe level of consumption 50-75% needs improvement 75-120% acceptable level of consumption >120 over consumption								

Table 2: Dietary Adequacy from Calories, Protein, and Macro-minerals among studied patients classified according to severity of liver disease by Child Pugh score.

of regular meals for reasons of pending examinations and procedures. Some authors also considered that overzealous dietary restrictions by the doctors is one of the important iatrogenic causes of malnutrition in hepatic patients [14]. We found several wrong advices our patients received by their doctors, the most frequent wrong advice was related to meat restriction (50% of child B patients) and the least advice likely to be wrong is that related to salt restriction. The advice of Carbohydrate restriction was given to 20% of child A patients, 40% of Child B patients and 26.7% of Child C patients and it was a not indicated in all of them.

In our study, there was highly significant relationship between malnutrition assessed by SGA and progression of liver disease assessed by Child Pugh score. Similar work was done by Patricia et al., who confirmed that malnutrition degree increases with progress of liver disease [15].

Dietary assessment in our study was performed using 24 hour recall method and food frequency questionnaire. This was to assess adequacy of intake according to recommended guidelines proposed by ESPEN, and to assess variations in food elements intake. We related results of adequacy of intake (obtained by 24 hour method) to severity of liver disease assessed by Child Pugh score. Relating dietary adequacy of calories and protein to Child Pugh score, we found that unacceptable (< 50% and 50-75%) was predominant (72.2% of totally studied patients) and increased with progress of liver disease (80% of Child C patients). This comes in agreement with Singh et al. who studied 259 patients with liver disease, dietary assessment was performed using 24 hour recall method and found that caloric and protein intake was further observed to be significantly low in patients with Child-Pugh C patients [16].

On the other hand over consumption of protein (<120%) was predominant (36.7% of totally studied patients) especially in compensated group (Child A) patients resembling 43.3% of this group. This agrees with a study conducted by Yasutake et al. on 47 Japanese outpatients with liver cirrhosis due to hepatitis C and compensated (Child A), dietary adequacy was assessed using a modified form (a self-administered diet history questionnaire), an excessive intake of energy and/or protein was much more prevalent than was an insufficient intake of energy and/or protein, only one patient was with insufficient energy intake, no patient had insufficient protein intake [17].

Group								Nutrient
Total		C		B		A		
%	NO	%	NO	%	NO	%	NO	
								Iron
17.8	16	23.3	7	16.7	5	13.3	4	< 50%
18.9	17	23.3	7	20	6	13.3	4	50-75%
22.2	20	20	6	20	6	26.7	8	75-120%
41.1	37	33.4	10	43.3	13	46.7	14	≤ 120%
P = NS								
								Zinc
25.6	23	40	12	20	6	16.7	5	< 50%
21.1	19	26.7	8	20	6	16.7	5	50-75%
33.3	30	23.3	7	43.3	13	33.3	10	75-120%
20	18	10	3	16.7	5	33.3	10	≤120%
P = NS								
								Selenium<50%
7.8	7	6.7	2	6.7	2	10	3	50-75%
14.4	13	13.3	4	6.7	2	23.3	7	75-120%
15.6	14	20	6	13.3	4	13.3	4	≤ 120%
62.2	56	60	18	73.3	22	53.4	16	
P = NS								
								Copper
18.9	17	13.3	4	30	9	13.3	4	< 50%
17.8	16	23.3	7	16.7	5	13.3	4	50-75%
25.6	23	20	6	20	6	36.7	11	75-120%
37.7	34	43.4	13	33.3	10	36.7	11	≤ 120%
P = NS								
According to intake recommended for hepatic patients by ESPEN guidelines: < 50% unsafe level of consumption 50-75% needs improvement 75-120% acceptable level of consumption >120 over consumption								

Table 3: Dietary Adequacy from Micro-minerals among studied patients classified according to severity of liver disease by Child Pugh score.

Group								
Total		C		B		A		
%	NO	%	NO	%	NO	%	NO	Nutrient
								Vitamin A
71.1	64	66.7	20	76.7	23	70.1	21	< 50%
12.2	11	20	6	3.3	1	13.3	4	50-75%
10	9	3.3	1	13.3	4	13.3	4	75-120%
6.7	6	10	3	6.7	2	3.3	1	≤ 120%
P = NS								
								Vitamin C
43.3	39	36.7	11	40	12	53.3	16	< 50%
13.3	12	13.3	4	16.7	5	10	3	50-75%
20	18	20	6	13.3	4	26.7	8	75-120%
23.4	21	30	9	30	9	10	3	≤ 120%
P = NS								
								Vitamin B1
40	36	46.7	14	46.6	14	26.7	8	< 50%
18.9	17	20	6	16.7	5	20	6	50-75%
28.9	26	23.3	7	30	9	33.3	10	75-120%
12.2	11	10	3	6.7	2	20	6	≤ 120%
P = NS								
								Vitamin B2
37.8	34	40	12	33.3	10	40	12	< 50%
31.1	28	30	9	33.3	10	30	9	50-75%
26.7	24	26.7	8	30	9	23.3	7	75-120%
4.4	4	3.3	1	3.4	1	6.7	2	≤ 120%
P = NS								
According to intake recommended for hepatic patients by ESPEN guidelines: < 50% unsafe level of consumption 50-75% needs improvement 75-120% acceptable level of consumption >120 over consumption								

Table 4: Dietary Adequacy from vitamins among studied patients classified according to severity of liver disease by Child Pugh score.

Studied group / Food Group	< 3 times/weekly			≥ 3 times/weekly			Total		
	No	%	Mean No of food items per individual	No	%	Mean No of food items per individual	No	%	Mean No of food items per individual
Cereals	341	21.0	3.8	255	20.4	2.8	596	20.8	6.6
Legumes	120	7.4	1.3	46	3.7	0.5	166	5.8	1.8
Vegetable	443	27.3	4.9	199	15.9	2.2	642	22.4	7.1
Fruits	69	4.3	0.8	65	5.2	0.7	134	4.7	1.5
Meat products	332	20.5	3.7	71	5.7	0.8	403	14.0	4.5
Milk products	78	4.8	0.9	164	13.1	1.8	242	8.4	2.7
Fats	4	0.2	0.04	76	6.1	0.8	80	2.8	0.9
Sweets	104	6.4	1.2	142	11.4	1.6	246	8.6	2.7
Spicy	16	1.0	0.2	94	7.5	1.04	94	3.8	1.04
Beverages	114	7.0	1.3	139	11.1	1.5	139	8.8	1.5

Table 5: Mean Number of Food group items intake per Individual per week by food frequency assessment tool.

We found that unacceptable level of consumption (> 50% and 50%-75%) of calories was predominant and increased with progress of malnutrition, this agrees with the similar work were caloric intake was recorded and patients were divided accordingly to with adequate and inadequate diet intake, patients with adequate diet intake were 132 patients all were well nourished by SGA, inadequate diet intake were the rest of studied patients [18].

Using food frequency method, we found that frequent consumption of all food items by Child A group patients was more than that by Child C patients, which means that with progress of liver disease, there are less variations with more restrictions and limitations regarding the intake. This comes in agreement with Singh et al. stated that a deteriorated nutritional status in advanced liver disease has been associated with a more restrictive diet [16].

In general, we found that Food items that show less frequent are cereals, legumes, vegetables, fruits and meat products, and food items that show more frequent intake by studied patients (more than three times per week) are milk products, fat, spicy, and beverages. As regard consumption of vegetable proteins (cereals, legumes) versus animal proteins, in our study both types of proteins were less frequently consumed weekly (less than three times) by all patients. Similar work was done by Idris and Al Ali, in the majority of the patients in this study (53.5%) consumed more fat and meat than other types of food groups on their daily life. Most patients eat a little fruit and vegetables, and a lot of carbohydrates and meat [19].

This study aimed at assessing thoroughly the dietary intake among

Food intake freq. / Food Groups	< 3 times/weekly			≥ 3 times/weekly			Total			P value
	No	%	Mean No of food items per individual	No	%	Mean No of food items per individual	No	%	Mean intake	
Cereals										
A	130	38.1	4.3	94	36.9	1.2	224	37.6	7.5	NS
B	120	35.2	4.0	81	31.8	1.1	201	33.7	6.7	
C	91	26.7	3.0	80	31.4	1.1	171	28.7	5.7	
Legumes										
A	48	40.0	1.6	13	28.3	0.4	61	36.7	2.0	NS
B	31	25.8	1.0	16	34.7	0.5	47	28.3	1.6	
C	41	34.2	1.4	17	37.0	0.6	58	34.9	1.9	
Vegetables										
A	182	41.1	6.1	65	32.6	2.2	247	38.5	8.2	NS
B	135	30.5	4.5	67	33.7	2.2	202	31.5	6.7	
C	126	28.4	4.2	67	33.7	2.2	193	30.0	6.4	
Fruits										
A	29	42.0	1.0	18	27.7	0.6	47	35.1	1.6	0.021
B	28	40.6	0.9	22	33.8	0.7	50	37.3	1.7	
C	12	17.4	0.4	25	38.5	0.8	37	27.6	1.2	
Meat and meat products										
A	124	37.3	4.1	27	38.0	0.9	151	37.5	5.0	NS
B	108	32.5	3.6	23	32.4	0.8	131	32.5	4.4	
C	100	30.2	3.3	21	29.6	0.7	121	30.0	4.0	
Milk and Milk products										
A	28	35.9	0.9	53	32.3	1.8	81	33.5	2.7	NS
B	29	37.2	1.0	55	33.5	1.8	84	34.7	2.8	
C	21	26.9	0.7	56	34.2	1.9	77	31.8	2.6	
Fats										
A	1	25.0	0.03	27	35.5	0.9	28	35.0	0.9	NS
B	3	75.0	0.1	28	36.8	0.9	31	38.8	1.0	
C	0	0.0	0.0	21	27.7	0.7	21	26.2	0.7	
Sweets										
A	31	29.8	1.0	53	37.3	1.8	84	34.1	2.8	NS
B	35	33.7	1.2	43	30.3	1.4	78	31.8	2.6	
C	38	36.5	1.3	46	32.4	1.5	84	34.1	2.8	
Spicy and salts										
A	4	25.0	0.13	37	39.4	1.2	41	37.3	1.4	NS
B	10	62.5	0.3	46	48.9	1.5	56	50.9	1.9	
C	2	12.5	0.1	11	11.7	0.4	13	11.8	0.4	
Beverages										
A	43	37.7	1.4	50	36.0	1.7	93	36.7	3.1	NS
B	37	32.5	1.2	50	36.0	1.7	87	34.4	2.9	
C	34	29.8	1.1	39	28	1.3	73	28.9	2.4	

Table 6: Mean Number of Food group items intake per Individual per week by food frequency assessment tool in relation to severity of liver disease assessed by Child Pugh score.

this particular group of patient and correlating these finding to their nutritional and clinical status, also spotting the light on the malpractice in this field in the form of wrong dietary advice or unjudged restrictions. The limitations in this study were the lack of link between the level of dietary intake of macro and micronutrient and their actual blood assay and clinical signs of deficiency if present.

Finally we can conclude that dietary assessment is an important part of the assessment of liver disease patients and offers helpful nutrition interventions to ensure satisfactory nutrient intake and improve the overall clinical outcome of the patient.

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