

Exploration of Nutritional Concepts among Patients of Chronic Liver Diseases and Their Health Care Providers

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Abstract Background: Nutrition in chronic liver disease (CLD) is an important area of research that could have an influential role on morbidity and mortality. To date, no clear guidelines were established for nutrition in CLD. **Aim of the work:** to assess the thoughts of patients and the knowledge of their health care providers about nutritional concepts in CLD. **Patients & methods:** This cross-sectional study enrolled two groups; patients group involving 350 CLD patients and health care providers group (involving 32 physicians and 31 nurses). All participants answered a validated questionnaire about nutritional knowledge (for health care providers) and behaviors (for the patients). **Results:** The majority of the patients (96.9%) denoted receiving nutritional advices from physicians. There was no role for nurses in nutritional education of patients. Proteins, lipids and minerals have the main interest in physicians' advices in frequencies of 93.4%, 96%, and 92.9%, respectively. Patients were taking proteins of plant rather than animal origin in amounts less than they need fearing of its complications. Another notable misconception was the intake of large amounts of carbohydrates. Dealing with lipids was the best by patients (only 19.7% were taking high amounts of lipids). But minerals, specially iron were restricted by large number of patients due to misconceptions. **Conclusion:** There are many misconceptions about nutrition in the majority of patients with CLD, and to lesser extent in their healthcare providers. Emerging of Egyptian nutritional guideline that highlights improving the dietitian role in nutritional services in our hospitals is mandatory for a sensible achievement in this area in the future.

Keywords: nutrition, chronic liver disease, protein, lipid, carbohydrate

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1. Introduction

Egypt has the highest age-standardized cirrhosis-related mortality of 72.7 deaths per 100,000. Almost one-fifth (18.1%) of all deaths in Egyptian males aged 45 to 54 years were due to liver cirrhosis [1].

The constituents of dietary regimen are very important for those patients as a properly balanced diet provides the nutrients needed to stay healthy, and to prevent further damage to the liver especially in patients with compensated cirrhosis who are hypermetabolic and need increased quantity of protein to achieve nitrogen balance and to avoid malnutrition [2,3,4,5].

In addition, nutritional therapy is very important in the proper management of CLD complications including ascites, hepatorenal syndrome, hepatic encephalopathy (HE), and upper gastrointestinal (GIT) bleeding. Internationally, the only published guidelines for nutrition in CLD is the European society for clinical nutrition and metabolism (ESPEN) guideline [6].

Although Egypt is suffering from a significantly high prevalence of CLD, there are no published Egyptian

guidelines to date. So, this study was conducted to assess the knowledge of patients and their healthcare providers (physicians and nurses) about nutrition concepts of CLDs.

2. Patients & Methods

Study design: A cross sectional study.

Setting: The study was conducted from June 2014 to December 2015, at Specialized Medical Hospital, Mansoura University, Egypt.

Groups of the study: As shown in Figure 1:

Patients' group: A total 350 Patients with CLDs selected from The Hepatology Outpatient Clinics (n=194) and The Inpatients' of Hepatology Unit (n=156). Our inclusion criteria for patients groups were patients with CLDs; with age above 18 years, while patients with acute states (e.g. acute HE, GIT bleeding, or hepatorenal syndrome) were excluded. All the patients were subjected to thorough history taking, complete clinical examination with thorough assessment of nutritional status, including body mass index (BMI), Triceps skin-fold thickness (TF), mid-arm circumference (MAC), and Child-Turcott-Pugh (CTP) Score [7].

Healthcare providers' group:

Physicians' subgroup: Thirty two physicians (Residents and Assistant Lecturers) from Internal Medicine and Hepatology Departments.

Nurses' subgroup: Thirty one nurses.

2.1. Assessment of Nutritional Knowledge of Patients and Healthcare Providers

Three separate questionnaires were prepared; one for patients, one for physicians, and one for nurses by reviewing other established questionnaires used for assessment of chronic disease [8]. The domain was their knowledge of nutritional concepts in CLD. The questionnaires were then validated by testing them on 50 individuals representing all the three study groups (20 physicians, 15 nurses and 15 patients). Analysis of the results with appropriate modifications when required led to the final version of our questionnaires that were applied to the large samples of the study.

2.2. Sample Size & Statistical Analysis

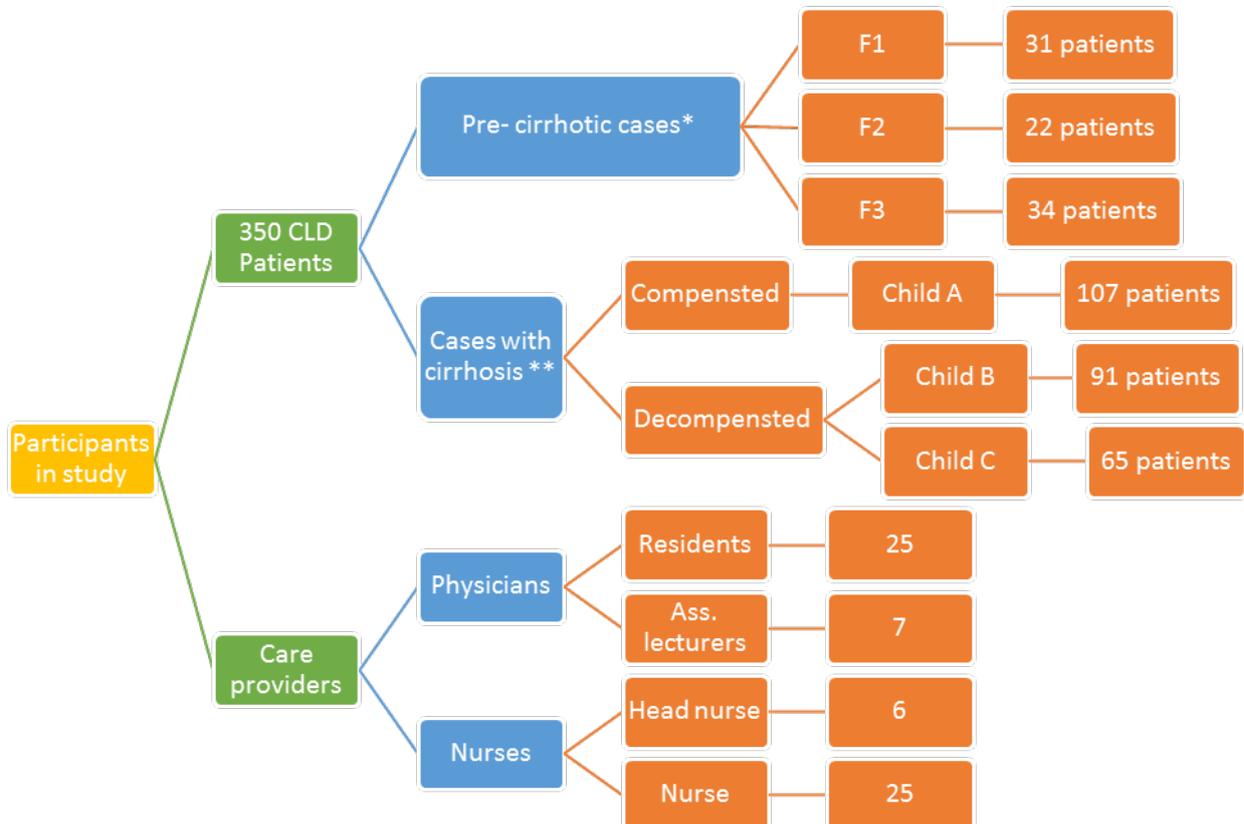
The sample size was calculated using EpiInfo™ version 7.1.5.0. (Release 2015); a trademark of the Centers for Disease Control and Prevention (CDC). Assuming 73.5% of CLD patients received dietary advices from physician [6] and expected to increase this percentage to 80.0%, at α error of 5.0% (95.0% confidence) and a study power of 80.0%. The calculated sample size was 267 and by adding 20.0% for improving quality of data collection, so the study sample would be 350 patients. Data were

collected through using the questionnaires, coded, computed and statistically analyzed using SPSS (statistical package of social sciences) version 17.0. The results presented in tables and figures; the categorical variables were presented as frequency and percentage while continuous (quantitative) variables were presented as mean \pm SD (if normally distributed) or median and interquartile range (if not). Normality was tested by Kolmogorov-Smirnov test (for large samples) or Shapiro-Wilk test (for small samples <50). Categorical variables were compared by Chi-square (or Fisher's Exact) test. Normally distributed continuous variables were compared by Independent - Samples t-test (for 2 groups) or One-Way ANOVA (for 3 or more groups). When continuous variables were not normally distributed, the equivalent nonparametric tests were used for comparisons (Mann-Whitney test for 2 groups and Kruskal - Wallis test for 3 or more groups). Correlation (Pearson's or Spearman's) was used to test a linear relationship between 2 continuous variables. The difference is considered significant when $p \leq 0.05$.

3. Results

3.1. Etiology of CLD

CLD was related to hepatitis C virus (HCV) in 332 patients (95%), combined hepatitis C and B in 14 patients (4%), and autoimmune liver diseases in only 4 patients (1%); three with autoimmune hepatitis, and one with primary biliary cirrhosis.



* Fibrosis was assessed by METAVIR Score, ** Severity of CLD was assessed by Child-Turcott-Pugh (CTP) Score

Figure 1. Flow chart of all participants in the study

3.2. Assessment of Nutritional Concepts among CLD Patients

The socio-demographic characteristics of the studied patients are shown in Table 1. Income was low in 96% of patients. However, there was no statistically significant correlation between income and the amount of protein intake ($r=0.012$, $p= 0.823$).

Nutritional advice was given to 251 patients (71.7 %) about all the 3 organic elements (protein, carbohydrate [CHO] and lipids), to 74 patients (21.1 %) about protein and lipids, to 11 patients (3.14%) about lipids alone (3 were obese, 7 were overweight and 1 has ideal weight), and only to one patient (0.3%) about protein and CHO, to another one about protein alone, and to a third one (diabetic) about CHO alone. So, advice was given to a total of 339/350 (96.9%) while 11/350 patients (3.1%) did not receive advice about any of the 3 organic elements (Figure 2).

Although a greater percent of advice was offered to patients through private clinics (186, 54.9%) than through hospital care setting (153, 45.1%), this difference didn't achieve a statistical significance ($p=0.082$). Adherence to the given advice was stated by 298/339 patients (87.9%). However, 168/339 patients (49.6%) stated that their adherence was followed by their physicians and that the change in body weight of only a minority was monitored. There was no role for media or magazines in the education process of patients, Nurses neither give any nutritional advices nor do they monitor patients' weight (Table 2).

Table 1. Socio-Demographic characteristics of the studied patients

	Count (350)	Percentage (%)
<i>Sex:</i>		
Male	195	55.7 %
Female	155	44.3 %
<i>Residence</i>		
Urban	98	28 %
Rural	252	72 %
<i>Education</i>		
Illiterate	123	35.1%
Read & Write	86	24.6 %
Iry school	38	10.9 %
High school	54	15.4 %
University	49	14 %
<i>Income</i>		
Not enough	336	96 %
Enough	13	3.7 %
Enough & Save	1	0.3 %
<i>Family size</i>		
Up to 5 persons	149	42.5 %
6 or 7 persons	180	51.5 %
8 persons or more	21	6 %
<i>Other family members with CLD</i>	102	29.14 %

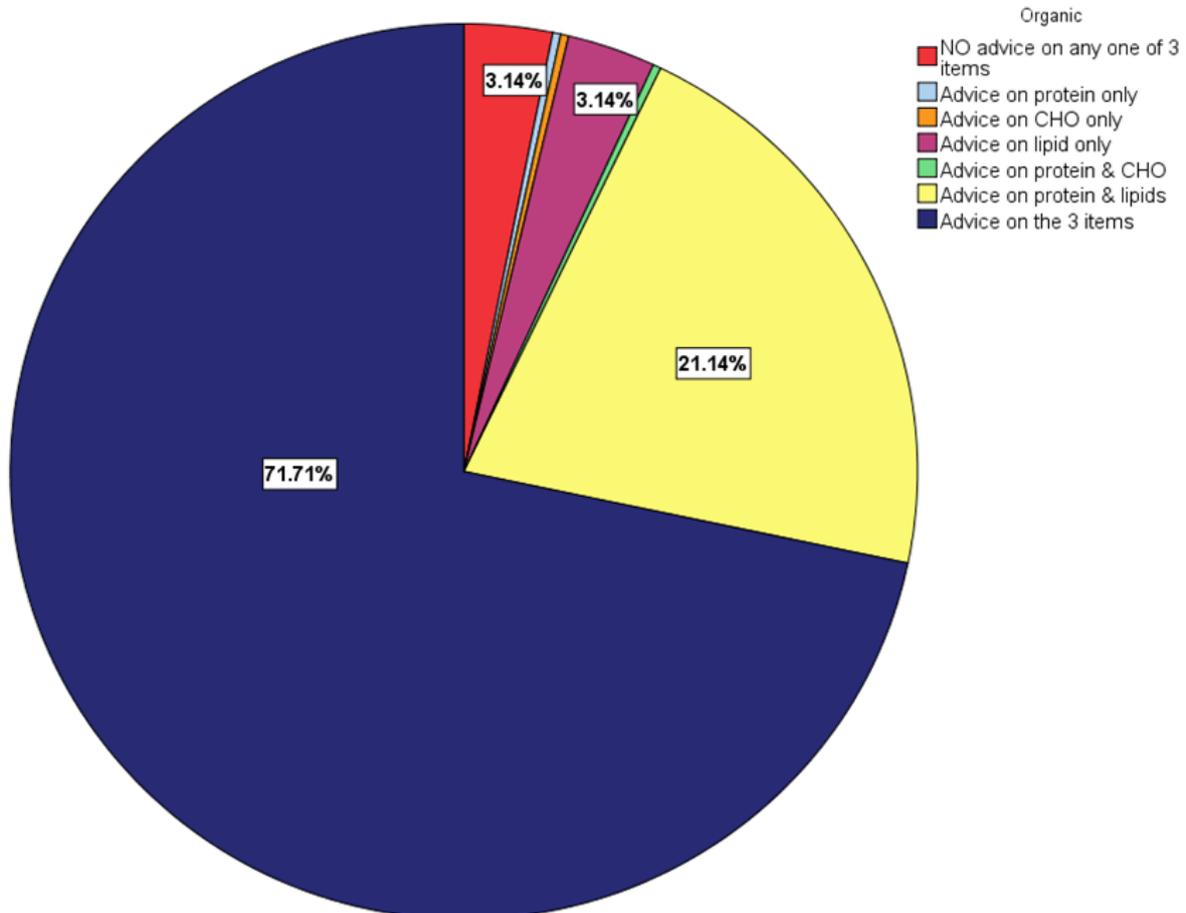


Figure 2. The medical advices about organic & non-organic elements

Table 2. Advice about organic & non-organic elements intake and its sources

	Patients take advice		Source of advice *					p value
	count	%	Physician	Nurse	TV	Books	Friends	
<i>Organic elements</i>								
Protein	327	93.4	302(92.3 %)	—	—	—	26(7.7 %)	< 0.0001
CHO	253	72.3	225(88.9 %)	—	—	—	28(11.1%)	< 0.0001
Lipids	336	96	303(90.2 %)	—	—	—	33(9.8 %)	< 0.0001
<i>Non-organic elements</i>								
Minerals	325	92.9	302(92.9 %)	—	—	—	23(7.1%)	< 0.0001
Iron	270	77.1	245(90.7 %)	1(0.3%)	1(0.3%)	—	24(8.8%)	< 0.0001
Vitamins	325	92.9	246(75.6 %)	—	1(0.3%)	—	78(24 %)	< 0.0001

*Patient can choose more than one choice
TV: Television media.

Table 3. Nutritional habits of the 350 patients

	Count	%	p*
Meals			
Regular	276	78.9 %	<0.0001
Irregular	74	21.1%	
Appetite			
Good	223	63.7 %	<0.0001
Poor	127	36.3%	
Number of meals/day			
<3	35	10 %	<0.0001
3-5	300	85.7%	
> 5	15	4.3 %	

p* from one-sample Chi-square test.

Table 3 showed the nutritional habits of studied patients, with a significant percent of patients (78.9%) taking regular meals, a significant percent (63.7%) having good appetite, and a significant percent (85.7%) taking 3-5

meals per day with a minority (4.3%) exceeding 5 meals per day.

This study noted that the majority of patients were consuming proteins of plant origin like beans by 86.8% while they were restricting animal proteins like red meat by 49.7%, and eggs by 40.6% except fish which was the most commonly consumed animal protein by 94.3%. Only 119 patients (34%) were taking proteins less than required because they feel that this might cause complications (60 %) and/or because they don't like it (62.6 %). On the other hand, 105 patients (30%) were taking proteins more than required due to misconception that red meat is the only protein to be restricted.

Among the 87 pre-cirrhotic patients with fibrosis stages of F1-F3 by METAVIR score, 29 patients (33.3%) were taking less than the required amount of protein (restriction group), and 58 patients (66.7%) were taking at least the required amount. However, this difference was not statistically significant ($p=0.455$). In addition, no significant signs of protein malnutrition were encountered in restriction group including muscle wasting ($X^2=0.025$, $p=0.875$) and divarication of recti ($X^2=0.584$, $p=0.445$) (Figure 3).

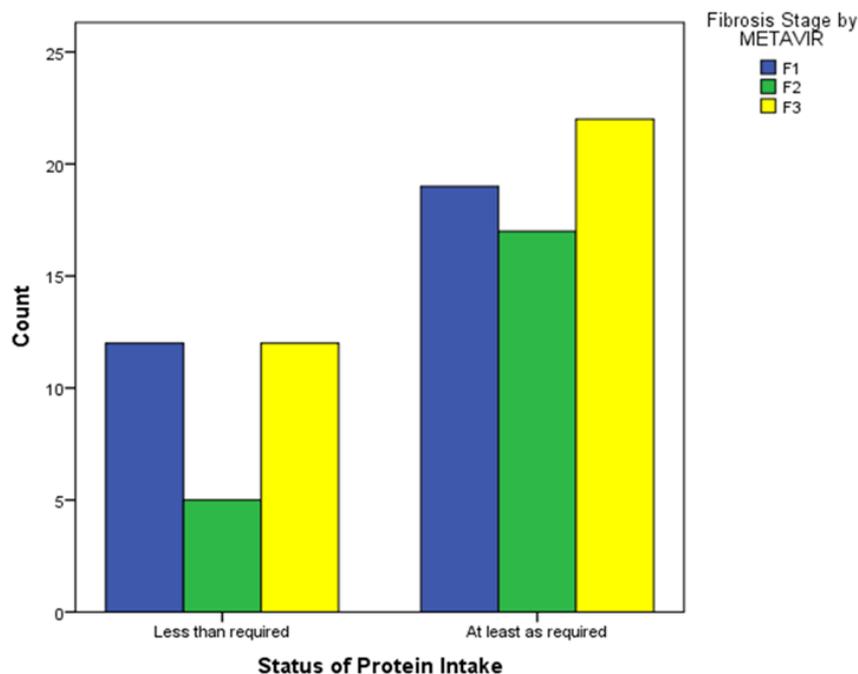


Figure 3. Status of protein intake among patients with different stages of liver fibrosis

Out of the 350 studied patients, 197 (56.3%) were taking more than the required amounts of CHO believing that it is not dangerous to the liver either as misconception or as explained by their physicians while the rest of patients were taking the required or less than required amounts following either their doctors' advice, or their misconceptions or fear of complications (most were diabetics, n=107 patients).

The mean \pm SD of BMI of our *diabetic* patients was 29.41 ± 3.07 kg/m²; the majority (100) were overweight/obese while only 7 patients had ideal BMI of less than 25 kg/m² with no observed correlation between their BMI & blood glucose level. Also, there was no statistically significant difference between uncontrolled and controlled diabetic patients as regards the amount of CHO intake (p=0.962).

About half of the patients use oils of plant origin in cooking, while lipids of animal origin like whipped cream, butter, or full cream milk were rarely used. Only 69 patients (19.7 %) were taking more than the required amounts of lipids to make their food tasty while the majority (80.3%) were taking lipids as required or even less than required for fear of complications or following their physicians' advice.

Natural minerals and added salts were given as required in 53.7 % of patients and more than required in 40.3 % while only 6% were receiving less than required.

Iron-containing foods like liver, potatoes, Spinach, leafy vegetables were eaten every few days by patients, while other elements like black honey & kidneys were almost never taken. More than one quarter (27.4%) of patients were not taking iron in the required amounts for fear of complications or following their doctor's advice.

Mid-arm circumference was negatively correlated with the amount of protein intake (r=-.153, p=0.004). Limb muscle wasting was diagnosed in 56.3% of patients, and a greater percent (75.1%) have divarication of recti.

Signs of vitamin deficiencies were found in more than one fifth of the patients; mainly pallor (67.1%), and ecchymoses (59.2%) [Table 4].

Table 4. Some signs of nutritional deficiencies in the studied patients

	Count (350)	Percentage (%)
Muscle wasting	197	56.3 %
Divarication of recti	263	75.1 %
<i>Signs of vitamin deficiency</i>	76	
Pallor	51	21.7 %
Bitot spots- dry mucous membranes	33	
Sored tongue- sulphur granules -chelirosis	17	
Ecchymosis - Bruises	45	
Purpuric eruptions	33	
<i>Ascites (Ultrasonography)</i>		
No	194	55.4 %
Mild	48	13.7 %
Moderate	77	22 %
Severe	31	8.9 %

3.3. Assessment of Nutritional Concepts among Health Care Providers

A total 32 physicians participated in this study, 25 were resident physicians & 7 were assistant lecturers. Thirty one (96.9%) stated that they give their patients nutritional

advices. The majority (93.8%) give their advices verbally, and only 56.2 % give their patients written advices. Twenty five physicians were monitoring their patients' adherence to advice. Only 11 physicians (34.4%) were following up their patients' weight and 50 % were teaching the nurses.

A total of 31 nurses participated in this study. The majority of them had not received any educational program about nutrition in CLDs (only 16.1 % obtained it during undergraduate or postgraduate periods). About 11 (35.5%) of the participants had received some advices in hospital through lectures. Eighteen nurses (58.1%) stated that the sources of these advices were personal communication with their physicians and not organized educational programs. About their role in implementation of these nutritional advices to hepatic patients, 28 of them (90.3 %) stated that they were giving advices and 19 (61.3 %) monitor the patients' adherence. Seventeen of them (54.8 %) follow diet of patients in hospital and only 10 monitor patients' weight.

On evaluation of the knowledge of the care providers, it seems average (mean score was 9.4 ± 1.93 , ranging from 5 to 14) and only 9.4 % have good and updated knowledge. On evaluation of nurses' knowledge, the majority (96.7%) have poor knowledge.

4. Discussion

Patients with chronic liver disease should maintain a balanced diet. Many factors, however, intervene with ensuring this adequate nutrition. The majority of our patients have HCV which was associated with diabetes in 30.6% of cases adding another burden for ensuring adequate nutrition. Moreover, the majority have low income which might have an impact on the quality and quantity of nutritional support. However, there was no statistically significant correlation between patient' income and the quantity of protein intake in this study. Qualitatively, the majority of our patients (87%) were *consuming* proteins of plant origin like beans while they were *restricting* animal proteins like red meat by half of the patients and eggs by two fifths of the patients except fish which was the most commonly *consumed* animal protein by 94.3% of patients. This higher consumption of the cheaper proteins might explain the lack of correlation between income and protein quantity.

Because of hypermetabolic state, cirrhotic patients should achieve "positive" nitrogen balance by consuming a daily protein quantity similar to those needed by healthy individuals [9] or even more [10]. Quantitatively, one third of pre-cirrhotic patients (F1-F3) in this study were taking less than the required amount of protein. This misconception extended also to those with compensated cirrhosis.

In this study, less than three quarters of patients were given full instructions about all the 3 organic elements, and one quarter were partially instructed about either one or two of these elements leaving a minority (3.1%) of patients who did not receive any advice about any one of the 3 organic elements. Moreover, more than half of physicians give their advice to patients only as a written form without verbal clarification. Lack of full and clear

advice in more than a quarter of patients can't be explained by lack of knowledge as it was average for the majority of physicians, and even good and updated in nearly 10%.

Although a greater percent of advice was offered to patients through private clinics than through hospital care setting, this difference didn't achieve a statistical significance. However, this difference might be explained by the greater workload in our governmental hospitals where there is also lack of the presence of nutritionists.

Nearly 88% of physicians who participated in this study stated that they are giving advice to their patients. However adherence to this advice was followed by less than a half of physicians and the change in body weight was monitored by only a minority of physicians. Similarly, most of the nurses who participated in this study stated that they are giving advice to patients, less than two thirds monitor patients' adherence, slightly more than one half are following diet of patients in hospital, and only about one third are monitoring patients' weight. Thus a notable problem discovered in this study was that most physicians were following patients' medications rather than their adherence to dietary instructions. Another notable problem is that most nurses were advising patients without proper knowledge.

The inefficiency of cirrhotic liver in storing glycogen with rapid oxidation of muscles between meals rationalize the trend for small frequent meals to avoid longer periods of fasting [11]. In this study, a significant percent of patients (nearly 86%) were taking 3-5 meals per day with only a minority (4.3%) exceeding 5 meals per day.

Cirrhosis is marked by decreased glucose oxidation associated with increased lipid oxidation [6], and insulin resistance which could be explained by chronic hyperinsulinemia or decreased insulin degradation by the diseased liver [12]. So, patients with cirrhosis may suffer from impaired glucose tolerance or even diabetes mellitus [13]. In this study, 56.3% of patients were taking more than the required amounts of CHO believing that it is not dangerous to the liver either as misconception or as explained by their physicians while the rest of patients were taking the required or less than required amounts following either their doctors' advice, or their misconceptions or fear of complications (most of them were diabetics).

Adequate intake of calories is crucial in the management of cirrhotic patients because if it is low, protein will be used to meet energy requirement, while excessive calories can lead to lipid accumulation inside the liver [11]. In this regard, lipids in low volume can give calories without adding free water; which seems beneficial for hyponatremic patients in particular. So, recommendations for dietary fat ranges from 10-20% [14] to 20-40% [15].

Qualitatively, about half of our patients use oils of plant origin in cooking, while lipids of animal origin like whipped cream, butter, or full cream milk were rarely used. Quantitatively, less than one fifth were taking more than the required amounts of lipids to make their food tasty while remainder were taking lipids as required or even less than required for fear of complications or following their physicians' advice.

Iron overload may predispose to bacterial infections by inducing several immunologic disorders including inhibition of lymphocyte proliferation. Also, hyperferritinemia

imposes a greater risk of SBP independently of liver disease severity and alcohol consumption [16,17].

In this study, iron-containing foods like liver, potatoes, spinach, leafy vegetables were eaten every few days by patients, while other elements like black honey & kidneys were almost never taken. Slightly more than one quarter of patients were not taking iron in the required amounts for fear of complications or following their doctor's advice.

Only one half of physicians stated that they are teaching the nurses while only one third of nurses stated that they received some advices in hospital through lectures and personal communication with their physicians. This elucidates the problem of lack of nurses' training.

5. Conclusions

Three nutritional flaws were clarified in this study. Initial nutritional advice of patients with chronic liver disease was found to be imperfect despite the average level of knowledge documented among the participating physicians. Imperfection was even more evident in the stage of follow up of nutritional status of the patients. A second flaw was that nurses were giving nutritional advice despite their poor knowledge. A third one was the finding that patients themselves have many nutritional misconceptions. These flaws highlight the utmost need to improve knowledge of nurses and patients and to improve practice among physicians.

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