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# Nutritional Assessment for Liver Cirrhosis Patients in Yemen/Sana'a 2021

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## Abstract

**Introduction:** There is a strong association between liver diseases and nutrition abnormalities, such as malnutrition in cirrhotic patients, which is very common and usually accompanied by worsening liver functions, greater clinical severity and increased mortality.

**Aim of the Study:** To assess the nutritional status of patients with liver cirrhosis by using the "Subjective Global Assessment Tool" and to correlate the degree of malnutrition of those patients with their laboratory results, clinical findings and lifestyle.

**Method:** The present study is cross-sectional, including 60 patients admitted to some hospitals and clinics in Sana'a-Yemen. Data collection started from the beginning of September until the end of December; the sample of the study was composed of 60 patients who fulfilled the predetermined inclusion criteria. Nutritional assessment of the patients was based on the Subjective Global Assessment (SGA) tool which classifies the nutritional status of those patients into three scores: well-nourished-A, moderately malnourished-B and severely malnourished-C. The nutritional assessment is also based on laboratory findings.

**Results:** The study revealed that 16.7% of the patients had good nutritional status with SGA score A, 61.7% of them had mild to moderate nutritional status with SGA score B and 21.7% had severe nutritional status with SGA score C.

Furthermore, the SGA tool was statistically significantly associated with many laboratory findings.

**Conclusion:** In conclusion, all the cirrhotic patients were divided into three categories. The first category: is well-nourished (16.7%), the second one: is mild-moderately/malnourished (61.7%) and the third: is severely malnourished (21.7%).

This means patients with liver cirrhosis disease suffer from mild to moderate malnutrition; "Subjective Global Assessment" is a new, valid and more comprehensive tool for the assessment of the nutritional status of patients suffering from liver diseases.

For this reason, nutritional screening for early identification of those at risk of malnutrition is of great importance to take care of the nutritional needs of these patients.

***Keywords:*** *Nutrition; Assessment; SGA; Liver Cirrhosis*

## Introduction

The liver is one of the most complicated organs metabolically, that many essentially important functions in the human body. This organ in some people gets diseased as a result of different factors and one of the diseases that it could face is "Cirrhosis", which is severe,

permanent scarring of hepatic tissues [1]. As a patient become cirrhotic, they start becoming malnourished; and malnutrition have been associated with an increased risk of infections, longer hospitalization and higher prevalence of portal hypertension-related complications, thus could result in mortality [2]. The severity of malnutrition is indicated by the severity of cirrhosis.

Protein-energy malnutrition -a form of malnutrition noticed and observed in cirrhotic patients- is more common among cirrhotic patients leading to a poor prognosis and a declined quality of life for these patients [3,4]. This life-threatening disease, as reported by Sarin [5] killed over one million people worldwide in the last decade; cirrhosis results from many different factors, some of which are related to some bad lifestyle behaviors, while other factors include certain types of chronic hepatic diseases such as "Chronic Hepatitis C". Since this field of study is so important, not been studied previously in Yemen, this study was made to find out the most causing factors of this disease in the city (Sana'a) as being the capital of the country crowded -as usual- with most of the population. Assessment in this study was made according to the population's attitudes, manners and the most practiced lifestyle behaviors thought to negatively affect health, like smoking, chewing Qat and over drinking energy drinks. The assessment depends on a set of parameters including questions related to the practiced daily behaviors, widely thought to be associated with cirrhosis and the nutrition screening tool Subjective Global Assessment [6,7] which relies on several standards and basic measurements as clinical evaluation, history of recent nutrients intake, weight changes, etc. to figure out and prove the significant relation between the causative factors and the disease, as well as the relation between the disease itself and its consequences. The prevalence rate of malnutrition among liver cirrhosis patients is high in Sana'a city thus this study aimed to determine the relationship between liver cirrhosis and malnutrition in Sana'a, with emphasis on studying the effects and consequences of previous dietary habits and bad lifestyles of cirrhotic patients, Identifying the impact of this disease on the various status of patients during the period of the disease and evaluation of the anthropometric, biochemical and clinical variables in the liver cirrhosis patients to identify the ones who are malnourished.

## Methodology

### Study area

Samples units-patients with cirrhosis were collected from the following areas:

- University of science and technology hospital (Outpatient clinics)
- Republican hospital
- Kuwait hospital
- Dr. Mohammed Salem No'man center for liver diseases
- Dr. Khaled Me'sar center for liver diseases.

### Study population

In this study, the targeted population (study sample) was focused on the following age groups: "adulthood and old age".

### Study design

Cross-sectional study (Prevalence study).

### Sample size

The sample in this study is composed of 60 patients having liver cirrhosis.

## Tools

1. Questionnaire
    - Malnutrition screening tool (MST)
    - Subjective global assessment (SGA)
    - Nutrition care process (NCP)
2. Physical examination
3. Biochemical test.

## Variables:

1. Dependent:
    1. Lab tests
    2. Muscle loss
    3. Fat loss
    4. Gender
2. Independent:
    1. Physical activity
    2. Bad and poor lifestyle, such as:
        A. Qat chewing
        B. Smoking
3. Previous weight
4. Variety of diet
5. Age
6. Appetite loss.

## Sampling strategy

The method used to select the sample units'/human subject units (cirrhotic patients) was the "Random Sampling Unit".

### Anthropometric measurements

- Age
- Gender
- Physical active
- Weight
- Height.

### Biochemical and hematological tests:

1. CBC:
    - Hb
    - PLT
    - RBC
    - WBC
2. Liver function tests:

- Albumin
- Creatinine
- Bilirubin total
- Serum bilirubin
- SGPT (ALT)
- SGOT (AST)
- ALP.

### Clinical features:

- Pain when eating
- Nausea
- Dental problems

- Anorexia
- Dysphagia
- Feeling full quickly
- Vomiting
- Diarrhea
- Constipation
- Dizziness
- Jaundice
- Ascites
- Edema
- Fatigue.

### Data analysis:

- SPSS
- Excel sheet.

### Ethical consideration

Taking permission from the center/hospital to be sampled besides the approval from each human subject participating in the sample; the data collectors were also informed that those participants have the full right to discontinue or refuse the participation at any time during the study and all their private and personal information will not be used out of the research study or shared with others.

## Results

### Age of participating patients (Sample units)

The frequencies and percent of participating subjects (cirrhotic patients), where the highest frequency and percentage was that for subjects from 40 years old and less (f:31/p:51.7%), while the least frequency and percent were for the subjects more than 40 years old (f:29/p:48.3%).

### Gender

Table 1 indicates the total number of participating subjects with their genders. The total number of all subjects is 60, (65%) of this total with a frequency of (39) was for male-participating subjects and the rest (35%) with a frequency of (21) was for female-participating ones.

| Gender | Frequency | Percent |
|---|---|---|
| Males | 39 | 65.00 |
| Females | 21 | 35.00 |
| Total | 60 | 100.00 |

***Table 1:*** *Gender of the participating subjects.*

### Patients' income

The highest frequency and percentage were for the ones with middle income (f:36/p:63.3%), then the ones with low income (f:21/p:35%). On the other hand, the least frequency and percentage were for the only subject with high income (f:1/p:1.7%).

### Duration of the disease

Table 2 illustrates the duration of cirrhosis among the involved patients. A duration of four years and less got a frequency of 41 and a percent of 68.33%, a duration of more than 4 years a frequency of 19 and a percent of 31.67.

| Duration of disease | Frequency | Percent |
|---|---|---|
| 4 Years and less | 41 | 68.33 |
| More than 4 years | 19 | 31.67 |
| Total | 60 | 100.00 |

***Table 2****: Duration of the disease.*

### Bad lifestyle habits

Table 3 indicates that many of the participating subjects used to chew Qat with a frequency of 52 and a percent of 86.67%. A large number of them also used to smoke with a frequency of 32 and a percent of 53.33% and some others used to drink energy drinks with a frequency of 23 and a percent of 38.33%.

| | Chewing Qat | | Smoking | | Drinking Energy Drinks | |
|---|---|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent | Frequency | Percent |
| Yes | 52 | 86.67 | 32 | 53.33 | 23 | 38.33 |
| No | 8 | 13.33 | 28 | 46.67 | 37 | 61.67 |
| Total | 60 | 100.0 | 60 | 100.0 | 60 | 100.0 |

***Table 3:*** *Bad lifestyle habits*

### Loss of body fat

Table 4 illustrates the amount of body fat loss among all the cirrhotic patients by percent and frequency. Some of the participating patients, who were at the early stage of cirrhosis, have not lost their body fat with the disease yet; those patients make up a frequency of (10) and a percent of (16.67%) of the total number. On the other hand, some other subjects have lost their body fat mildly to moderately, those subjects make up a frequency of (34) and a percent of (56.67%) and the rest of the subjects have lost their body fats severely; those make up the remaining frequency (16) and percent (26.67%).

| Loss of body fat | Frequency | Percent |
|---|---|---|
| No | 10 | 16.67 |
| Mild-Moderate | 34 | 56.67 |
| Sever | 16 | 26.67 |
| Total | 60 | 100.0 |

***Table 4:*** *Loss of body fat.*

### Loss of muscle mass

Table 5 shows the amount of loss of muscle mass among all the involved cirrhotic patients by frequency and percentage. A frequency of (12) and a percent of (20%) of the total number of patients have not reached the degree of losing muscle mass. In contrast, a frequency of (34) and a percent of (56.67%) of the patients have lost mildly to moderately of their muscle mass. The rest of the involved diseased subjects have lost their muscle mass severely; those subjects make up a frequency of (14) and a percent of (23.33%) of the whole sample.

| Loss of Muscle Mass | Frequency | Percent |
|---|---|---|
| No | 12 | 20.00 |
| Mild-Moderate | 34 | 56.67 |
| Sever | 14 | 23.33 |
| Total | 60 | 100.0 |

***Table 5:*** *Loss of muscle mass*

### Categories of subjective global assessment

Categories of subjective global assessment are three: well nourished (SGA A), moderately undernourished (SGA B) and severely undernourished (SGA C). Based on the obtained results, it has been established that 13 patients (21.67%) are severely undernourished (SGA C), 37 patients (61.67%) are moderately undernourished (SGA B), while only 10 patients (16.67 %) are well-nourished (SGA A) (Table 6).

| SGA Rating | Frequency | Percent |
|---|---|---|
| Well-nourished Normal | 10 | 16.67 |
| Mildly-moderately/malnourished some progressive nutritional loss | 37 | 61.67 |
| Severely malnourished Evidence of wasting and progressive symptoms | 13 | 21.67 |
| Total | 60 | 100.0 |

***Table 6:*** *Categories of subjective global assessment*

### Edema

Table 7 explains the status of edema among the patients in the sample. A frequency of 39 (65%) of the patients in the sample had no edema, a frequency of 17 (28.33%) of the participating patients had pit edema of extremities/ pitting to the knee, possible sacral edema if bedridden and the rest of the sample units make up a frequency of 4 (6.67%) that had pitting beyond the knee, sacral edema if bedridden and may also have generalized edema.

| Edema | Frequency | Percent |
|---|---|---|
| None | 39 | 65.00 |
| Pitting edema of extremities/pitting to knee, possible sacral edema if bedridden | 17 | 28.33 |
| Pitting beyond knee, sacral edema if bedridden, may also have generalized edema | 4 | 6.67 |
| Total | 60 | 100.0 |

***Table 7:*** *Edema among patients*

### Ascites

Table 8 illustrates the presence and absence of ascites among the sample units. A frequency of 22 (36.67%) of patients had no ascites, which indicates the absence of ascites among this part of the sample, whereas a frequency of 38 (63.33%) had ascites, indicating the presence of ascites among the rest of the sample.

| Ascites | Frequency | Percent |
|---|---|---|
| Absent | 22 | 36.67 |
| Present (may only be present on imaging) | 38 | 63.33 |
| Total | 60 | 100.0 |

***Table 8:*** *Ascites among patients*

### Subcutaneous fat

### Signs under the eyes

The table 9 below shows that 40% (f:24) of the participants had slightly bulging areas, while 56.67% (f34) of them had a somewhat hollow look, slightly dark circles and some others 3.33% (f:2) had hollowed look, depression and dark circles.

| Under the eyes | Frequency | Percent |
|---|---|---|
| Slightly bulging area | 24 | 40.00 |
| Somewhat hollow look, Slightly dark circles | 34 | 56.67 |
| Hollowed look, depression, dark circles. | 2 | 3.33 |
| Total | 60 | 100 |

***Table 9:*** *Signs under the eyes.*

### Triceps

The results in table 10 show that 40% (f:24) of the patients in the sample had a large space between fingers, 35% (f:21) of them had some depth to fat tissue, but not ample, loose-fitting skin and 25% (f:15) of the patients had very little space between fingers or fingers touch.

| Triceps | Frequency | Percent |
|---|---|---|
| Large space between fingers | 24 | 40.00 |
| Some depth to fat tissue, but not ample, loose fitting skin | 21 | 35.00 |
| Very little space between fingers, or fingers touch. | 15 | 25.00 |
| Total | 60 | 100.0 |

***Table 10:*** *(Triceps).*

### Ribs, lower back, sides of trunk

Table 11 indicates the status of the ribs, lower back and sides of the trunk. 48.333% (f:29) of the cirrhotic patients in the sample had a full chest; their ribs do not show, and they had a slight to no protrusion of the iliac crest. While 38.333% (f:23) of the patients had obvious ribs, indentations are not marked and their lilac crest was somewhat prominent. The rest 13.333% (f:8) had very obvious indentation between ribs and their lilac crest was very prominent.

| Ribs, Lower back, Sides of trunk | Frequency | Percent |
|---|---|---|
| Chest is full; ribs do not show. Slightly to no protrusion of the iliac crest | 29 | 48.333 |
| Ribs obvious, but indentation are not marked. Lilac crest somewhat prominent | 23 | 38.333 |
| Indentation between ribs very obvious. Lilac crest very prominent | 8 | 13.333 |
| Total | 60 | 100.0 |

***Table 11:*** *Ribs, lower back, sides of trunk.*

### Muscle wasting

### Temple

The results in table 12 shows that most of the sample (63.333%) (f:38) had well-defined muscles, 28.333% (f:17) had slight depression and 8.333% (f:5) had hollowing and depression.

| Temple | Frequency | Percent |
|---|---|---|
| Well-defined muscle | 38 | 63.333 |
| Slight depression | 17 | 28.333 |
| Hollowing, depression | 5 | 8.333 |
| Total | 60 | 100.0 |

***Table 12:*** *Temple status among the participating patients.*

### Clavicle

Results in table 13 and illustrates the status of clavicle among the patients, where 41.67% (f:25) was not visible in males; may be visible but not prominent in females. 38.33% (f:23) had some protrusion in their clavicle (may not be all the way along) and 20% (f:12) had protruding /prominent bone.

| Clavicle | Frequency | Percent |
|---|---|---|
| Not visible in males; may be visible but not prominent in females | 25 | 41.67 |
| Some protrusion; may not be all the way along | 23 | 38.33 |
| Protruding /prominent bone | 12 | 20.0 |
| Total | 60 | 100.0 |

***Table 13:*** *Clavicle status among cirrhotic patients.*

## Shoulder

As illustrated in table 14 45% (f:27) of the patients in the sample had rounded shoulders. 38.33% (f:23) of them had no square look and their acromion process may protrude, whereas 16.67% (f:10) has square look and their bones were prominent.

| Shoulder | Frequency | Percent |
|---|---|---|
| Rounded | 27 | 45.0 |
| No square look; acromion process may protrude | 23 | 38.33 |
| Square look; bones prominent | 10 | 16.67 |
| Total | 60 | 100.0 |

***Table 14:*** *Shoulders status.*

## Scapula/Ribs

Table 15 indicates the status of scapula/ribs among the cirrhotic patients in the sample. 48.33% (f: 29) of the patients in the sample had no prominent bones and no significant depression. 36.67% (f:22) of the patients had mild depression (bones may show slightly; not all areas) and 15% (f:9) had prominent bones and significant depression.

| Scapula\Ribs | Frequency | Percent |
|---|---|---|
| Bone not prominent; no significant depression | 29 | 48.33 |
| Mild depressions or bone may show Slightly; not all areas | 22 | 36.67 |
| Bones prominent; significant depressions | 9 | 15.0 |
| Total | 60 | 100.0 |

***Table 15****: Scapula/Ribs.*

## Quadriceps

Table 16 indicates the status of quadriceps among the patients in the sample; where a frequency of 55 (33%) of them had a well-defined shape of quadriceps and a frequency of 33.33 (20%) had depression/medial atrophy in the shape of their quadriceps and a frequency of 11.67 (7%) had a prominent knee/severe depression medially.

| Quadriceps | Frequency | Percent |
|---|---|---|
| Well defined | 33 | 55 |
| Depression /atrophy medially | 20 | 33.33 |
| Prominent knee, severe depression medially | 7 | 11.67 |
| Total | 60 | 100.0 |

***Table 16:*** *Quadriceps*

### Interosseous muscle between thumb and forefinger (Back of the hand)

Table 17 explains the status of the interosseous muscle between the thumb and forefinger (back of the hand) among all the participating units of the sample. A frequency of 32 (53.333%) had muscle protrudes (which could be flat in females), a frequency of 23 (38.333%) had a slightly depressed interosseous muscle between thumb and forefinger, while the rest-making up a frequency of 5 (8.333%)- had flat or depressed interosseous muscle between thumb and forefinger.

| Interosseous Muscle Between Thumb and Forefinger (Back of Hand) | Frequency | Percent |
|---|---|---|
| Muscle protrudes; could be flat in females | 32 | 53.333 |
| Slightly depressed | 23 | 38.333 |
| Flat or depressed area | 5 | 8.333 |
| Total | 60 | 100.0 |

***Table 17:*** *Interosseous muscle between thumb and forefinger (back of hand).*

### SGA rating

Table 18 shows the relationship between SGA score and different variables including the age, gender and duration of diseases. A Chi-square test was used.

| Well-nourished Normal | | SGA Rating | | | Total | P-value |
|---|---|---|---|---|---|---|
| | | Mildly-moderately/ malnourished some progressive nutritional loss | severely malnourished Evidence of wasting and progressive symptoms | | | |
| Sex | Male | 6 | 26 | 7 | 39 | 0.53 |
| | | 15.4% | 66.7% | 17.9% | 100.0% | |
| | Female | 4 | 11 | 6 | 21 | |
| | | | | 28.6% | 100.0% | |
| Duration 2 | 4 years and less | 7 | 24 | 10 | 41 | 0.718 |
| | | 17.1% | 58.5% | 24.4% | 100.0% | |
| | More than 4 years 4 years and less | 3 | 13 | 3 | 19 | |
| | | 15.8% | 68.4% | 15.8% | 100.0% | |
| | | 7 | 24 | 10 | 41 | |
| Age | From 40 years old and less | 5 | 21 | 5 | 31 | 0.521 |
| | | 16.1% | 67.7% | 16.1% | 100.0% | |
| | More than 40 years old from 40 years old and less | 5 | 16 | 8 | 29 | |
| | | 17.2% | 55.2% | 27.6% | 100.0% | |
| | | 5 | 21 | 5 | 31 | |

***Table 18:*** *SGA rating.*

The results show that P-values are more than 0.05 which means that there is no relationship between SGA and these variables (age, gender and the duration of the diseases).

## Biochemical test

Table 19 shows the biochemical tests at different levels (normal and at risk) among patients.

| | | Frequency | Percent |
|---|---|---|---|
| Potein2 | Normal | 7.0 | 70.0 |
| | At risk | 3.0 | 30.0 |
| | Total | 10.0 | 100.0 |
| Albumin2 | Normal | 14.0 | 42.4 |
| | At risk | 19.0 | 57.6 |
| | Total | 33.0 | 100.0 |
| Bilirubin3 | Normal | 8.0 | 38.1 |
| | At risk | 13.0 | 61.9 |
| | Total | 21.0 | 100.0 |
| Creatinine5 | Normal | 20.0 | 64.5 |
| | At risk | 11.0 | 35.5 |
| | Total | 31.0 | 100.0 |
| SGPT6 | Normal | 12.0 | 57.1 |
| | At risk | 9.0 | 42.9 |
| | Total | 21.0 | 100.0 |
| SGOT7 | Normal | 16.0 | 76.2 |
| | At risk | 5.0 | 23.8 |
| | Total | 21.0 | 100.0 |
| ALP8 | Normal | 1.0 | 20.0 |
| | At risk | 4.0 | 80.0 |
| | Total | 5.0 | 100.0 |
| CBC9 | Normal | 4.0 | 66.7 |
| | At risk | 2.0 | 33.3 |
| | Total | 6.0 | 100.0 |
| Hb1 | Normal | 15.0 | 44.1 |
| | At risk | 19.0 | 55.9 |
| | Total | 34.0 | 100.0 |
| WBC1 | Normal | 16.0 | 59.3 |
| | At risk | 11.0 | 40.7 |
| | Total | 27.0 | 100.0 |
| RBC2 | Normal | 14.0 | 60.9 |
| | At risk | 9.0 | 39.1 |
| | Total | 23.0 | 100.0 |
| PLT1 | Normal | 7.0 | 35.0 |
| | At risk | 13.0 | 65.0 |
| | Total | 20.0 | 100.0 |

***Table 19:*** *Biochemical tests.*

## Discussion

From table 1 it is clear that liver cirrhosis is more common in the age of ≤ 40 years, but less common in the age of more than 40 years (but the difference between them was a small percentage). This may be explained by the following reasons, including consuming Qat, smoking, or infection of the patient with the hepatitis B virus or C virus, infection with the schistosomiasis worm and lack of early diagnosis of liver diseases [8]. These are the reasons for the spread of cirrhosis among patients under the age of ≤ 40. The results obtained by our study are compared with the results obtained from [2]. Both studies give a different indication. that indicated that liver cirrhosis is more common in the age of ≥ 50 years.

From table 2 the results illustrate that liver cirrhosis is more common among males rather than females. These results can be justified by the fact that men in the Yemeni society chew Qat more than women and are less committed to eating meals. These results are the same as the ones concluded in the study of [2], which was carried out on 50 patients (41 males and 9 females).

Table 3 show patients' income, where the highest frequency and percentage were for the ones with middle income (f:36/p:63.3%), then the ones with low income (f:21/p:35%). On the other hand, the least frequency and percentage were for the subjects with high income (f:1/p:1.7%); the reason behind these results is that those with middle or low income buy the cheapest kind of cigarette, Qat and energy drinks which contain more toxic substances; thus they were more vulnerable and got liver cirrhosis. In comparison to the study of Waheed., *et al*. [9], there were differences, the highest frequency and percentage were for the ones with high income (f:18/p:30.0%), then the ones with middle income (f:10/p:16.7%). On the other hand, the frequency and percentage for the subjects with low income were (f:7/p:11.7%), the frequency and percentage (f:11/p:18.3%) were for working females/women and the frequency and percentage (f:14/p:23.3%) were for housewives.

In this study, table 4 illustrate the duration of cirrhosis among the involved patients. A duration of four years or less got a frequency of 41 and a percent of 68.33%, a duration of more than four years, the frequency and percentage (f:19/p: 31.67%) the reason for these results is "Hepatitis C and B" and Bilharzias in our country which causes liver cirrhosis. In comparison to another study conducted for liver cirrhosis patients [2], the results of disease duration were not close to this study; patients whose duration of the disease was 1 - 2 years got a frequency of 24 and a percent of 48.0%, patients whose duration of the disease was > 2 years got a frequency of 26 and a percent of 52.0%.

In this study, there are 52 out of 60 patients chewed Qat; it is clear from the results that Qat has a clear impact on liver cirrhosis since the Qat plant directly affects the liver through the toxic substances it contains -as the high amount of pesticides for example- and liver is the main organ in the human body responsible for getting rid of toxins; thus, it gets affected over time. To our knowledge, there is no study on the effect of chewing Qat on liver cirrhosis.

In the results of this study, there are 32 out of the 60 patients smoke; smoking affects the liver badly as it causes a variety of adverse effects on it. The liver is an important organ that has many tasks. Among other things, the liver is responsible for processing drugs, alcohol and other toxins to remove them from the body [10,11]. Heavy smoking yields toxins which induce necroinflammation and increase the severity of hepatic lesions (fibrosis and activity scores) when associated with hepatitis C virus (HCV) or hepatitis B virus (HBV) infections. Cigarette smoking increases the risk of developing HCC (Hepatocellular Carcinoma) among chronic liver disease (CLD) patients independently of liver status. Association of smoking with hepatocellular carcinoma (HCC) irrespective of HBV status has been reported [8]. Our study did not provide the necessary proof that there is a relationship between drinking energy drinks and the occurrence of cirrhosis.

In our study, table 4 illustrate the amount of body fat loss among all the cirrhotic patients by percent and frequency. Some of the participating patients, who were at the early stage of cirrhosis have not lost their body fat with the disease yet; those patients make up

a frequency of (10) and a percent of (16.7%) of the total number. On the other hand, some other subjects have lost their body fat mildly to moderately, those subjects make up a frequency of (34) and a percent of (56.7%) and the rest of the subjects have lost their body fats severely; those make up the remaining frequency (16) and percent of (26.7%), the reason for these results is that cirrhosis makes it more difficult for the body to process nutrients, leading to weakness and weight loss; liver cirrhosis was characterized by a significant reduction in body cell mass, body fat and by a redistribution of body water. In comparison to another study [7], the results are close to our results, patients who have not lost their body fat with the disease yet got a frequency of 17 and a percent of 13.6%, In contrast, some other subjects have lost of their body fat mildly to moderately, those subjects make up a frequency of 85 and a percent of 68% and the rest of the subjects have lost of their body fats severely; those make up the remaining frequency 23 and percent 18.4%.

In our study, table 5 shows the amount of loss of muscle mass among all the involved cirrhotic patients by frequency and percentage. A frequency of (12) and a percent of (20%) of the total number of patients have not reached the degree of losing muscle mass. In contrast, a frequency of (34) and a percent of (56.7%) of the patients have lost mildly to moderately of their muscle mass. The rest of the involved diseased subjects have lost their muscle mass severely, those subjects make up a frequency of (14) and a percent of (23.3%) of the whole sample, the reason for these results is protein-calorie malnutrition and low physical activity [12]. Compared to another study [7], the results are close where patients who haven't lost their muscle mass with the disease yet got a frequency of 51 and a percent of 40.8%, On the other hand, some other subjects have lost of their muscle mass mildly to moderately, those subjects make up a frequency of 65 and a percent of 52 and the rest of the subjects have lost of their muscles mass severely; those make up the remaining frequency 9 and percent 7.2%.

Table 6 illustrates the categories of subjective global assessment (SGA Rating) used to assess the effects of malnutrition on cirrhotic patients. According to our results, it has been established that 13 patients (21.7%) are severely undernourished (SGA C), 37 patients (61.7%) are moderately undernourished (SGA B), while 10 patients (16.7%) are well-nourished (SGA A). This indicates that the highest percentage was for the ones who were moderately undernourished (SGA B) due to the apparent decrease in food and nutrient intake by 5% - 10%, weight loss or gain without stability and mild appearance of some symptoms affecting eating. Compared to a study conducted for liver cirrhosis patients [7], it is clear that both studies give the same indication that liver cirrhosis is more common among those who are moderately undernourished (SGA B), where the results in that study were as the following: a frequency of (77) out of 125 from the total number of patients and the percent was (61.6%).

In our study, table 7 illustrates the presence of edema among all the cirrhotic patients by percent and frequency, those patients who had no edema make up a frequency of (39) and a percent of (65.0%) of the total number and the patients who showed up the moderate presence of edema make up a frequency of (17) and a percent of (28.3%) of the total number and the ones who showed up sever presence of edema make up a frequency of (4) and a percent of (6.7%) of the total number. Edema is the accumulation of fluids in the extremities such as legs and hands and it is a sign that indicates the severity of the disease; our result was comparable with those Samar and Ashraf [7] result which found in liver cirrhosis patients, the patients who were absent of edema make up (76.8%) of the total number and the patients who showed up moderate/mild presence of edema make up (23.2%) of the total number.

Table 8 illustrates the presence of ascites among all the cirrhotic patients by percent and frequency, the patients who showed up with the absence of ascites (Normal) make up a frequency of (22) and a percent of (36.7%) of the total number, while the patients who showed up the presence of ascites (moderate, severe) make up a frequency of (38) and a percent of (63.3%) of the total number. When analyzing these results, it was indicated that patients with ascites were few, which indicates that the disease did not reach the advanced stages in most cases, but when analyzing the results the presence of ascites which is a strong sign that indicates the progress of the disease, it was found that most patients suffer from it and this indicates that they were in the advanced stages of the disease. In comparison to another study [7] the results in this part were not very close to our results. Patients who had no ascites make up a frequency of (35) and a percent

of (28%) of the total number and the patients who showed up with moderate/mild presence of ascites make up a frequency of (60) and a percent of (48%) of the total number and the patients who showed up sever presence of ascites make up a frequency of (30) and a percent of (24%) of the total number.

In this study, table 19 show that there is a relationship between laboratory tests and SGA, the cases were divided into two cases: many patients were in the early stage of the disease and the others were in the late stage. There was normal in many patients depending on some causes such as some patients followed a good diet plan that improves their status, the recommendation that the doctor said, also many patients were in early stages (mild disease) and they were injected with serum albumin that improves the indicator of protein and albumin in a laboratory test.

Many cases were at risk depending on low-income lead to not having an optimal diet, low education, no advice from a doctor or about the suitable diet for this disease and the severity of the disease leading to a decrease in their appetite that may deteriorate of patient status and there is no acceptable from patient to the recommendation. The normal protein test was (70%) because the patient was taken albumin (type of essential protein) that maintains the protein in the normal range. And at risk was (30%) because of the severity of the disease leading to the deterioration of the effect of drugs (albumin injection) that decrease the protein level [13].

## Conclusion

Patients with the cirrhotic liver are suffering from malnutrition and nutritional deficiencies as demonstrated by the Subjective Global Assessment Tool, a valid and more comprehensive tool to assess the nutritional status among these patients in Sana'a and it can be used with the other ordinary tools as anthropometric measurements, laboratory findings, regular follow up and proper management a patient's case.

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