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Assessment of malnutrition in patient with liver cirrhosis and its association with dietary intake

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***Abstract*---** Introduction: Cirrhosis is incurable, irreversible chronic liver disease and impose a health and economic burden. Malnutrition is related to the progression of liver dysfunction and it is associated with many complications. The current study aims to perform a nutritional assessment for patients with liver cirrhosis using SGA, and study the relationship between protein energy malnutrition and severity of liver cirrhosis using Child-Pugh score. Patients and methods: Cross-sectional study was conducted in Baghdad medical city for 4 months on 50 liver cirrhotic patients. Patients were interviewed, recall diet history, current nutritional requirement, SGA and Child-Pugh score were calculated for each patient, p value ≤ 0.05 were considered significant Results: The average age was 54.7±14.7 years. Majority were men, married, of primary or less education, living in urban settings. NAFLD (34%) and alcohol (32%) were the leading causes. Twenty-nine (58%) had sever disease and 16 (32%) were malnourished. The study showed a significant association between severity of disease and patients' state of nutrition. There was a significant difference in means of total calorie, protein, carbohydrates and fat intake between the two groups. Conclusions and recommendations: Malnutrition in cirrhotic patients upsurges the

disease burden, thus early recognition and correction of malnutrition is needed .

***Keywords*---** NAFLD, Cross-sectional study, malnutrition in patient.

Introduction

Liver diseases account for approximately 2 million deaths worldwide per year with about half the numbers due to complications related to liver cirrhosis. [1]

Cirrhosis is the incurable late and irreversible stage of chronic liver disease. During progression from the compensation to the decompensation stage, many morbidities and mortality can occur. Among the many liver disorders that can lead to cirrhosis, some progress rapidly while others progress more slowly. [2] Cirrhosis is not only a single disease entity, it is actually a result of various causes, such as alcohol abuse, chronic hepatitis B virus (HBV) and hepatitis C virus (HCV) infections, as well as non-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH). [3]

Although in recent years, medical treatment for cirrhosis has made some advancement. For example, the introduction of novel oral antiviral drugs, but the management of background liver disease remains a clinically substantial issue. Thus, liver cirrhosis is still showing an increasing trend and imposing a high medical and economic burden. [4] The etiology of liver cirrhosis differs according to the geographical site, in such a way that HBV being the primary cause in the Asia-Pacific region while in Europe, the escalation of liver cirrhosis cases may be linked to alcohol abuse in Northern Europe and viral hepatitis epidemics in Eastern and Southern European countries. In Mexico, Japan and the United States, it is mainly caused by HCV. [5,6] Likewise, in Iraq a study conducted in 2019 showed liver cirrhosis mainly among alcoholic and those with hepatitis infection. [7] Yet this distribution is subjected to change especially since the number of patients with cirrhosis caused by alcohol and NAFLD is still unceasingly growing. [5,6]

Malnutrition is a very common consequence of advanced liver disease occurring in 20-60% of cirrhotic patients. The onset and/or severity of malnutrition proceeds from a compromised nutritional state to an obvious loss of weight and finally to a lean body mass. Malnutrition not only is related to the progression of liver dysfunction but also it is associated with many complications of liver cirrhosis, such as infections, hepatic encephalopathy and ascites. Despite that malnutrition is often under recognized and under treated even though appropriate treatment can really improve outcomes. [8,9]

There are wide diversities in the definition of malnutrition in cirrhosis, primarily because adult malnutrition is not well defined. [10] Thus a nutritional assessment in cirrhotic patients is needed. Recent studies showed a prevalence of malnutrition risk ranging from 13.5 to 54.1% and depending on the used screening tools. [11,12] To our knowledge this is the first study that challenge the subject and aims to perform a nutritional assessment for patients with liver

cirrhosis using SGA. and study the relationship between protein energy malnutrition and severity of liver cirrhosis using pugh score.

Patients and methods

A cross sectional study was conducted from September 2021 till the end of February 2022, in Baghdad medical city Hospital, on 50 liver cirrhotic patients using random systemic sampling technique, every third patient with liver cirrhosis visiting the outpatient clinic during the time of study were included. Patients were interviewed, their demography, Body Mass Index (BMI), smoking and alcohol drinking history were recorded. Subjective Global Assessment (SGA) was used for each patient to define malnutrition into two categories: "Nourished" (included class A and B) and "Malnourished" (class C). Child-Pugh score was also calculated for each patient to indicate the severity of liver disease and patients were divided into two categories: "Mild/Moderate" and "Severe" liver diseases. In addition to that, recall diet history of the last 24 hours were documented and current energy and protein requirement were calculated for each patient.

Causes of liver cirrhosis were divided into NAFLD, alcohol, hepatitis related and other etiologies like Wilson's disease, autoimmune and primary biliary cirrhosis checked in patients' medical files.

Chi square was used to test the association between Pugh score and SGA, t student test was used to explore the difference in means between nourished and malnourished groups in term of current and required energy and protein intake. P value equal or less than 0.05 were considered significant

Results

The average age of cirrhotic patients was 54.7±14.7 years. Majority were men, married, of primary or less education, living in urban settings. Only 28% were enrolled in paid jobs; table 1, more than half 27 (54%) and 33 (66%) of patients were nonsmokers and not alcohol drinkers respectively

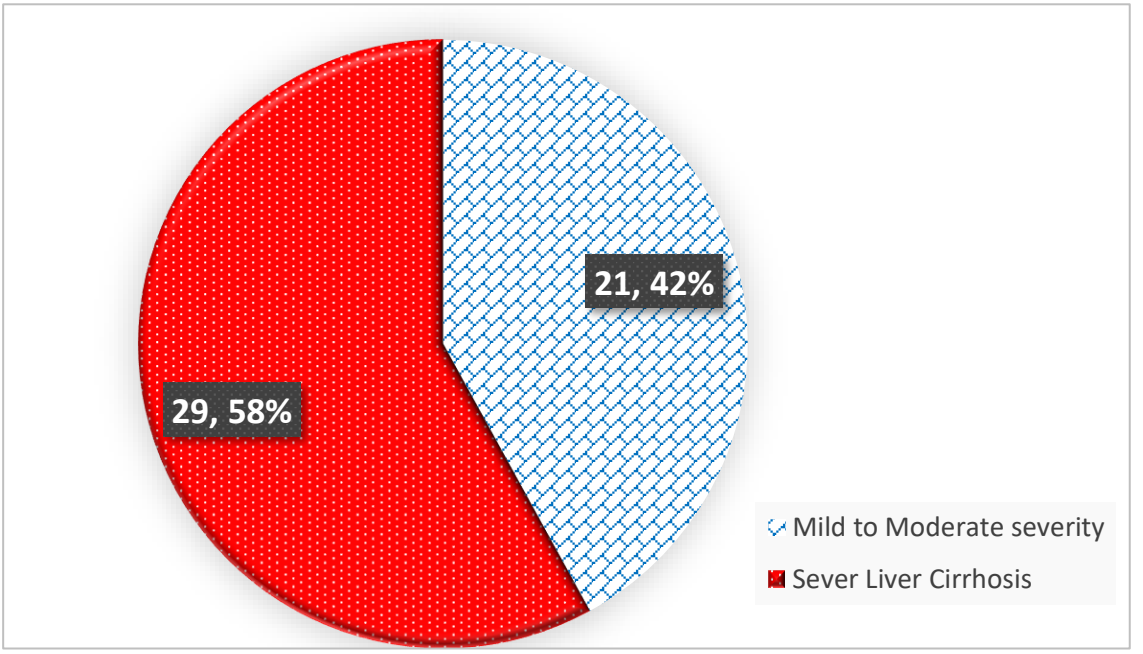
Table 1. Demographical distribution of the studied sample

Demographic variables		Frequency	Percent
Age in years	<50	17	34.0
	50-59	11	22.0
	≥60	22	44.0
Gender	Male	31	62.0
	Female	19	38.0
Marital Status	Married	40	80.0
	Not married	10	20.0
Occupation	Paid employee/er or private jobs	14	28.0
	Unemployed	8	16.0
	retired	9	18.0
	Housewife	19	38.0
Education	Illiterate	11	22.0

	Read and write	5	10.0
	Primary	16	32.0
	Intermediate	10	20.0
	Secondary or higher	8	16.0
Residency	Urban	34	68.0
	Rural	16	32.0
BMI	Underweight	8	16.0
	Normal	19	38.0
	Overweight	16	32.0
	Obese	7	14.0
Smoking	Nonsmoker	27	54.0
	Smoker	17	34.0
	Ex-smoker	6	12.0
Drinking	Not a drinker	33	66.0
	Current drinker	2	4.0
	Ex-drinker	15	30.0
Total		50	100

NAFLD (17; 34%) and alcohol (16; 32%) were the leading causes of liver cirrhosis followed by other causes (9;18%), HBV (5;10%) and HCV (3;6%). Average duration of the liver disease was 2.7±2.5 years. As for the severity of liver cirrhosis; figure 1, twenty-one (42%) had mild to moderate liver cirrhosis, while 29 (58%) had severe liver disease.

Figure 1. Distribution of patients according to liver cirrhosis severity.



Using the SGA nutritional assessment 34 (68%) were well to moderately nourished and 16 (32%) were severely malnourished.

Decreased appetite, nausea and vomiting, change in taste and following a restricted diet; table 2, all showed significant association with malnutrition.

Table 2 Distribution of patients by symptoms according to SGA assessment

Variables		SGA nutritional assessment		P value
		Nourished	Malnourished	
Decreased Appetite	No	24(82.8%)	5(17.2%)	0.009
	Yes	10(47.6%)	11(52.4%)	
Nausea and Vomiting	No	23(92.0%)	2(8.0%)	0.000
	Yes	11(44.0%)	14(56.0%)	
Ascites	No	8(80.0%)	2(20.0%)	0.468
	Yes	26(65.0%)	14(35.0%)	
Taste change	No	28(84.8%)	5(15.2%)	0.000
	Yes	6(35.3%)	11(64.7%)	
Dietary restrictions	No	23(82.1%)	5(17.9%)	0.016
	Yes	11(50.0%)	11(50.0%)	
Hepato-encephalopathy	No	25(67.6%)	12(32.4%)	0.912
	Yes	9(69.2%)	4(30.8%)	

A significant association was illustrated; table 3, between severity of liver cirrhosis and patients' state of nutrition. Eighty-one percent of patients with malnutrition had sever liver cirrhosis, while the percent decline to 47.1% among nourished patients.

Table 3 demonstrates the distribution of patients according to current nutritional status by severity of liver cirrhosis.

Variables		Child-Pugh Score		P value
		Mild to Mod severity	Severe liver cirrhosis	
SGA	Nourished	18(52.9%)	16(47.1%)	x^2=5.221,d.f.=1
	Malnourished	3(18.8%)	13(81.3%)	Pvalue=0.022

Comparing the means of calorie intake and requirements for nourished and malnourished liver cirrhotic patients; illustrated in table 4, A significant difference between total kilocalorie, protein, carbohydrates and fat intake between the two groups was noted.

Table 4. distribution of patients according to nutritional status by their energy intake

Variables		Nourished	Malnourished	P value
		M±SD	M±SD	
Intake	Kcal	1308.4±533.3	855.1±438.4	0.005
	Protein(g)	56.6±25.8	34.1±18.1	0.003

	CHO(g)	189.3±80.0	127.8±62.2	0.009
	Fat(g)	31.8±17.0	18.2±14.5	0.009
Requirement	Kcal	1974.1±267.4	1947±302.0	0.752
	Protein(g)	81.6±19.6	77.5±23.9	0.523
	Protein(%)	16.1±3.3	15.6±4.7	0.673
	CHO(g)	266.7±37.7	270±60.9	0.803
	CHO(%)	54.1±2.4	54.0±2.9	0.827
	Fat(g)	64.9±9.4	64.2±11.3	0.807
	Fat(%)	29.6±1.3	29.6±1.6	0.925
Percent of intake from requirement		66.7±25.9	42.8±19.8	0.002
Protein intake percent from requirement		70.8±28.2	44.6±20.2	0.002

Discussion

Cirrhosis carries out a substantial health burden on many countries and this burden has increased globally because of population growth and ageing. In the same context the current study showed that liver cirrhosis was more common among elderly men, agreeing with published global data reports. [13, 14] The average age was around 50s years which is comparable to that reported in south Korea [15], but higher than results reported by Mishra D et al from India (the mean age was 46 years). [16] A difference in population demography and causes of liver cirrhosis might had produced such variance. Liver cirrhosis mortality in elder patients was 12 times higher than that in younger patients. [17] Male predominance had been reported in several literature. [7, 13, 15, 16] Probably its related to a more daring life style habits compared to women in terms of drinking alcohol, exposure to HBV and HCV, although both genders show a parallel increase in the prevalence rates of obesity, metabolic syndrome and NASH. [18]

The current study showed a higher percent of NAFLD among the cirrhotic causes compared to previous Iraqi literature by Al-Khazraji K etal [7] where NAFLD constituted only 14% of causes. Yet our current result (34%) is in line with global estimates [1,19] as it had been reported that it is more than 30% in the Middle East and turkey. [20-22] Almost all mathematical modeling studies using current estimates of NAFLD, obesity, and diabetes forecast that the burden of NASH will increase over the next 10 years. [23] NAFLD was also considered to be the main factor in liver disease burden in the coming years in Saudi Arabia and United Arab Emirates. [24] it is closely associated with obesity, metabolic syndrome, and diabetes mellitus [21, 25] Keeping in mind that around 2,001 people had diabetes in 2021 which is projected to reach 4273 per 1000 population in 2045 [26] would definitely point the need for public health response to minimize and avert future onset of extra clinical and economic draining on the Iraqi health care system.

The second leading cause was alcohol consumption (32%). Our results were higher than that reported by Al-Khazraji etal [7] which might indicate a social habit acceptance and/or availability of the product in recent years. Alcohol is considered as both a primary cause and a cofactor, alcohol accounts for 30% to 50% of cirrhosis-related deaths globally. An important caveat to these data is that

alcohol accounts for a larger proportion of liver disease prevalence and mortality but is underreported by persons and countries because of cultural concerns and is often a secondary (and unreported) liver disease etiology that coexists with viral hepatitis or NAFLD.[23] The social habit acceptability thus differ by geography, in India around 63% had alcohol-related cirrhosis, Alcohol is considered the most common cause of liver cirrhosis there [16] On the other hand, alcohol consumption is not permitted in Iran, therefore alcohol use is not considered as a major cause. [17]

Around 16% of patients had viral hepatitis related cirrhosis which is comparable to results published by Mishra D et al (19.8%). [16] More than 60% of liver cirrhosis mortality cases are caused by hepatitis B and C infection. The rate of hepatitis B mortality is four times more than that from hepatitis C. [17] Reinforcing the vaccination program and early diagnosis with a specific focus on risky groups is vital.

The prevalence of malnutrition is high in cirrhotic patients and brings major complications including sepsis, ascites, encephalopathy, peritonitis, and hepatorenal syndrome and all are adversely affected by malnutrition. However, it is overlooked because of complexity of nutritional assessment in cirrhosis patients with fluid retention and/or overweight. [27-29] the study reported a significant association between severity of cirrhosis and state of nutrition agreeing with previous literatures. [10, 30, 31] In concordance the study also showed a significant association between decreased appetite, nausea and vomiting, change in taste and following a restricted diet with malnutrition. The clinical and pathophysiological mechanisms that cause malnutrition in cirrhosis are multiple. Anorexia and liver decompensation symptoms causes less dietary intake; metabolic changes in terms of high energy expenditure, reduced glycogen storage, accelerated starvation response and protein catabolism produce in-muscle and fat wasting. Malabsorption renders the cirrhotic patient unable to utilize consumed food. [29]

Conclusions and recommendations

Malnutrition in cirrhotic patients upsurges the disease burden, thus early recognition and correction of malnutrition is needed

Short running title: **Malnutrition in liver cirrhotic patients**

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