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Research Article

Nutritional assessment among patients of Chronic Liver Disease by Subjective Global Assessment scale and its correlation with the disease severity in southern part of Haryana

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ABSTRACT

Introduction: Individuals diagnosed with chronic liver disease (CLD) are susceptible to malnutrition due to the liver's role in regulating caloric balance. The subjective global assessment of nutritional status (SGA) is a cost-effective, straightforward, and efficient method employed by healthcare professionals to evaluate protein-energy malnutrition. Multiple studies have demonstrated a significant association between poor nutrition and adverse outcomes such as morbidity, hospitalization, and mortality in CLD patients. ***Aim*:** To assess the nutritional status of CLD patients using SGA, and to determine its relationship with the severity of the condition. ***Material and Methods*:** This cross-sectional study was carried in a tertiary care institute of southern part of Haryana. A total of 100 study subjects with CLD were recruited as per inclusion and exclusion criterion. A comprehensive assessment of the nutritional assessment was carried out using SGA. Severity of disease was assessed by Child-Pugh-Turcotte score (CPT Score) and Model for end stage liver disease (MELD) score. The association between nutritional status and disease severity was statistically ascertained. ***Results*:** Majority of the study population belonged to 31-40 years (26.0%) followed by 41-50 years (19.0%) and most of the CLD patients were male (69%). Severe malnourishment as assessed by SGA was significantly more among subjects with CPT Grade C (severe CLD), moderate to severe MELD & MELD Na scores (P value < 0.001*) ***Conclusion*:** Malnutrition is significantly associated with severity of chronic liver disease and SGA act as an important tool for assessment of malnutrition in patients with chronic liver disease.

INTRODUCTION

Individuals diagnosed with Chronic Liver Disease (CLD) are susceptible to malnutrition due to the liver's role in regulating caloric balance. Malnutrition in persons with CLD can be attributed to various reasons, including insufficient dietary intake, delayed absorption of fats caused by compromised bile acid synthesis, protein losses in the intestines, diminished ability of the liver to synthesize proteins, suboptimal utilization of nutrients, and heightened metabolic rate[1].

The presence of malnutrition in individuals with cirrhosis has been found to have notable implications, including the development of sepsis, uncontrolled ascites, hepatic encephalopathy (HE), spontaneous bacterial peritonitis, and hepato-renal syndrome. The prevalence of malnutrition in persons diagnosed with cirrhosis has been estimated to range from 20% to 60% across multiple studies. The Child-Pugh classification is commonly employed to assess the severity of end-stage liver disease in individuals[2]. Additionally, the Model for End-Stage Liver Disease (MELD) has gained global recognition for the purpose of listing and transplanting patients with end-stage liver disease. The MELD score has demonstrated its accuracy in predicting survival rates in various clinical scenarios, such as alcoholic hepatitis, variceal hemorrhage, infections in cirrhosis, post-surgery outcomes in cirrhotic patients (including liver resection), trauma, and hepatorenal syndrome[3,4]. The Model for End-Stage Liver Disease modified for Sodium concentration

(MELD-Na) score is a prognostic tool for patients awaiting liver transplant that is also commonly applied to estimate mortality in acute liver failure patients. Specifically, there is a 5% increase in mortality for each millimole decrease in serum sodium within the range of 125-140 millimoles per liter[5,6].

The subjective global assessment of nutritional status (SGA) is a cost-effective, straightforward, and efficient method employed by healthcare professionals such as nurses, dietitians, or physicians to evaluate protein-energy malnutrition (PEM) in individuals undergoing chronic dialysis[7]. The SGA relies on a clinical assessment that encompasses four sub-scales, which include evaluating the patient's recent weight fluctuations, nutritional intake, and gastrointestinal symptoms and physical examination which includes loss of subcutaneous fat (triceps, chest), muscle vesting (deltoids), ankle edema, sacral edema, ascites. Multiple clinical studies have demonstrated a significant association between the assessment of a single SGA and adverse outcomes such as morbidity, hospitalization, and mortality[8].

The purpose of this study was to examine the nutritional evaluation of patients suffering from chronic liver disease using subjective global assessment (SGA), and to determine its relationship with the severity of the condition in the southern region of Haryana.

MATERIAL AND METHODS

Study setting and population

This prospective clinical study was conducted after clearance from Institutional Ethical Committee in a tertiary care institute of Haryana during the period October 2020-March 2022.

Inclusion Criterion: All the patients above 18 years of age diagnosed as a case of chronic liver disease consenting for participation were included in the study.

Exclusion Criterion: Any patient with hepato-renal syndrome, hepatocellular carcinoma and pregnant women along with any co-morbidities such as Tuberculosis, Diabet-es Mellitus, hyperthyroidism, hypothyroidism, chronic renal disease and inflammatory bowel syndrome were excluded from the study.

Sample size estimation: A convenience sample size of 100 patients were taken in the study based upon the previous records of the study area as no similar study was found in India.

After receiving written informed consent from the eligible study participants, a detailed history, complete physical examination and routine investigations were done for all patients.

Severity of the liver disease was assessed using the Child-Pugh-Turcotte score (CPT Score), MELD score and MELD Na score. (Table 1)

The severity of cirrhosis:

➢ Child-Pugh A: 5 to 6 points

➢ Child-Pugh B: 7 to 9 points

➢ Child-Pugh C: 10 to 15 points

MELD score and MELD Na score

➢ Model for end stage liver disease (MELD)=3.78 X log [serum bilirubin (mg/dl)] +11.2 X log[INR]+9.57 X 9.57 X log[serum creatine (mg/dl)]+6.43

➢Model for end stage liver disease sodium (MELD Na) =MELD+1.59(135-serum sodium(meq/l) Both MELD and MELD Na score were classified into 3 groups as:

· Score 6-15 (Mild liver disease)

· Score 16-24 (Moderate liver disease)

· Score ≥25 (Severe liver disease)

The frequency of malnutrition among patients of chronic liver disease was assessed using the SGA scale and its correlation with the severity of the disease was analyzed. The subjects were classified as: 1.Well-nourished 2. Mild/ Moderately malnourished and 3.Severely malnourished.

Statistical Analysis

The collected data was entered into the Microsoft excel and the statistical analysis was performed by statistical software SPSS version 21.0. The Quantitative (Numerical variables) were present in the form of mean and SD and the Qualitative

Table 1 - Child-Pugh-Turcotte score (CPT Score)

VARIABLE	Score- 1	Score- 2	Score- 3
Encephalopathy	None	Grade 1 & 2	Grade 3 & 4
Ascites	None	Mild	Moderate & Severe
Bilirubin	< 2 mg/dl	2-3 mg/dl	3 mg/dl
Albumin	< 2 mg/dl	2.8-3.5 gm/dl	< 2.8 gm/dl
Prothrombin Time	< 2 mg/dl	4-6sec	6sec

(Numerical variables) were present in the form of mean and SD and the Qualitative (Categorical variables) were present in the form of number of patients (frequency) and percentage. Chi-square test was applied for comparing the frequency. The p-value was considered to be significant when less than 0.05

Results

Demographic profile

The socio-demographic details of the study participants have been described in table 2. Majority of the study population belonged to 31-40 years (26.0%) followed by 41-50 years (19.0%) with predominantly males around 69 %.

Clinical Profile

Clinical profile of the study subjects have been summarized in Table No. 3. Hepatitis B infection was detected in 14.0% of study population followed by Hepatitis C Virus infectionin 6 %. In the present study, it was analysed that 62 patient (62%) had severe CPT score followed by 29 patients had moderate CPT score and 9 patient had mild CPT score. The MELD grading system was employed to assess the severity of liver disease in the study population. The results indicated that 62 subjects (62.0%) had mild liver disease, 29 subjects (29.0%) had moderate liver disease, and 9 sub-

Table 2: Socio-demographic distribution of study participants (N=100)

Variables		Frequency	Percent
Age groups	16-30 years	13	13.0%
	31-40 years	26	26.0%
	41-50 years	19	19.0%
	51-60 years	17	17.0%
	61-70 years	11	11.0%
	Above 70 years	14	14.0%
Gender	Male	69	69.0%
	Female	31	31.0%
Religion	Hindu	54	54%
	Muslim	46	46%

Table 3: Distribution of study population according to clinical profile

		Frequency	Percent
Co-morbidities	HTN	35	35%
	COPD	26	26%
	IHD	4	4%
	NIL	35	35%
Viral markers	Non-reactive (NR)	78	78.0%
	Hepatitis C Virus (HCV)	6	6.0%
	Hepatitis B Virus (HBV)	14	14.0%
	HBV, HCV	1	1.0%
	HIV	1	1.0%
Alcohol consumption	Alcoholic	42	42.0%
	Non-Alcoholic	58	58.0%
CPT Score	Mild (A)	9	9.0%
	Moderate (B)	29	29.0%
	Severe (C)	62	62.0%

MELD Grading	Mild liver disease	62	62.0%
	Moderate liver disease	29	29.0%
	Severe liver disease	9	9.0%
MELD Na Grading	Mild liver disease	80	80.0%
	Moderate liver disease	11	11.0%
	Severe liver disease	9	9.0%
SGA Grading	Well-nourished (A)	32	32.0%
	Mild- to moderate malnutrition (B)	50	50.0%
	Severe malnutrition (C)	18	18.0%

Table 4: Comparison between SGA and CPT Grading

SGA Grading	CPT Grade		
	A	**B**	**C**
A	6	25	1
	66.7%	86.2%	1.6%
B	2	4	44
	22.2%	13.8%	71.0%
C	1	0	17

Table 5: Comparison between SGA and MELD Grading

SGA	MELD Grading		
	Mild	**Moderate**	**Severe**
A	32	0	0
B	51.6 %	0	0
	25	22	3
C	40.3 %	75.9%	33.3 %
	5	7	6
	χ^2 value = 21.157, p-value < 0.001		

Table 6: Comparison between SGA and MELD Na Grading

SGA	MELD Na Grading		
	Mild	Moderate	Severe
A	32	0	0
	40 %	0.00 %	0.00%
B	41	6	3
	51.3 %	54.5 %	33.3 %
C	7	5	6
	8.8 %	45.5 %	66.7 %
	χ^2 value = 14.667, p-value = 0.001		

-jects (9.0%) had severe liver disease. Similarly, the MELD Na grading system was utilized, revealing that 80 subjects (80.0%) had mild liver disease, 11 subjects (11.0%) had moderate liver disease, and 9 subjects (9.0%) had severe liver disease. Furthermore, the study employed the SGA grading system to evaluate the nutritional status of the participants. The findings demonstrated that 32.0% of the subjects were classified as well-nourished, 50.0% exhibited mild to moderate malnutrition, and 18.0% were severely malnourished.

Comparison of SGA with CPT grading, MELD and MELD Na grading

On comparison between SGA and CPT grading severe malnourishment was significantly seen more among subjects with CPT Grade C (Table No. 04). Severe malnourishment was significantly more among subjects with Moderate and Severe MELD Grading. (Table No. 05) with p-value < 0.001. Severe malnourishment was significantly more among subjects with Moderate and Severe MELD Na Grading.(Table No. 06) with *p* value =0.001.

Discussion

The etiology of malnutrition in patients with end-stage liver disease (ESLD) encompasses a range of factors. These include reduced intake due to conditions such as anorexia, ascites, encephalopathy, and altered gustatory sensation. Additionally, malnutrition can result from decreased absorption caused by inadequate bile flow and pancreatic insufficiency. Metabolic alterations, such as increased resting energy expenditure and protein requirements, post-prandial gluconeogenesis, and fat malabsorption, also contribute to malnutrition in ESLD patients. Furthermore, various iatrogenic factors, including overly restrictive dietary measures and frequent paracentesis, can further exacerbate malnutrition in this population[9].

Malnutrition has been linked to a range of adverse outcomes, including decreased patient and graft survival rates, prolonged stays in the intensive care unit and hospital, increased utilisation of blood products, hepatocyte damage, disease prognosis, post-transplant infections, and a higher incidence of ascites and encephalopathy in patients with ESLD.[10,11]There are several methodologies employed for evaluating malnutrition, with the Subjective Global Assessment (SGA) being the predominant approach utilised in assessing the nutritional status of patients during hospitalisation[12].

In the present study, the largest proportion (26.0%) of the study sample was observed in the age group of 31-40 years, followed by the age groups of 41-50 years (19.0%), 51-60 years (17.0%), 61-70 years (15.0%), above 70 years (12%), and 16-30 years (13.0%). The mean age of the participants in the study was 48.41±16.08. The average age was reported as 59±15 years by Mutsert et al. [12]

Total of 42 patients (42.0%) were identified as having alcohol use disorder, while the remaining 58 patients (58.0%) were classified as non-alcoholic individuals. Lim et al. [13] demonstrated comparable findings, as the majority of patients in their study were classified as non-alcoholic (54.5%), followed by alcoholic patients (18.2%). Mutster et al. [12] presented findings that are contrary to our study, in which it was observed that 65% of the patients were classified as alcoholic while the remaining 35% were categorised as non-alcoholic.

Present research states that out of the total sample size of 100 patients, 21% of the patients exhibited reactivity to viral markers, whereas the remaining 79% showed no reactivity. Among the cohort of 21 patients that exhibited reactivity to viral markers, it was observed that 14% tested positive for Hepatitis B, 6% tested positive for Hepatitis C, and 1% tested

positive for Hepatitis C, and 1% tested positive for HIV. The findings of this study are inconsistent with the research conducted by Topan M M et al. [14] which reported a prevalence of 25.6% for Hepatitis C infection and 11.5 % for Hepatitis B infection.

Significant proportion of the patients exhibited comorbidities , including hypertension was the most often reported co-morbidity, accounting for 35% of the cases. Followed by chronic obstructive pulmonary disease (COPD) with a prevalence of 26%, and ischemic heart disease at a lower rate of 4%.

In the present investigation, SGA grading revealed that 32.0% of the participants were classified as well-nourished, while 50.0% exhibited mild to moderate malnutrition, and the remaining 18.0% were identified as severely malnourished. The study conducted by Magdy et al. [11] revealed that a significant proportion of cirrhotic patients, specifically 88%, were found to be malnourished when assessed using the SGA grading.

Prevalence of severe malnourishment comes out to be notably higher among individuals classified as CPT Grade C (62%), followed by Grade B (29%) and Grade A (9%). Hassan et al. [15] discovered a statistically significant increase in the prevalence of severe malnutrition among those diagnosed with CPT C. Topan M. M. et al.[14] revealed that a significant proportion of patients exhibited Grade C and B CPT scores, with each category accounting for 39.1% of the sample and Grade A CPT scores were observed in 21.8% of the patients.

According to the MELD Grading system, our study found that 62 (62.0%) patients exhibited mild liver disease, whereas 29 (29.0%) patients were having moderate liver disease, and 9 (9.0%) patients presented with severe liver disease. Consistent with our research, Hassan et al [15] discovered that a majority of patients exhibited mild to moderate liver damage.

In the present study, the severity of liver disease was assessed using the MELD Na Grading system also. The results indicate that 80 (80.0%) patients exhibited mild liver disease, while 11 (11.0%) patients had moderate liver disease, and 9 (9.0%) patients presented with severe liver disease. Hassan et al.[15] discovered that a majority of patients exhibited mild to moderate liver damage.

The data gathered for the grading of Subjective Global Assessment was compared with the CPT score, MELD score, and MELD Na score in order to examine the relationship between the nutritional status of patients and the severity of their chronic liver disease. The obtained comparative results between the two groups, SGA and CPT score, showed statistical significance ($p < 0.001$). Similarly, the comparison between the two groups based on MELD grading also yielded statistically significant results ($p < 0.001$). Addittionally, the analysis of MELD Na grading revealed a significant difference between the two groups, with a p-value of 0.001. In accordance with our research, Hassan et al.[15] discovered a notable increase in severe malnutrition among individuals classified as CPT C.

The incidence of malnutrition exhibited a positive correlation with the severity of disease, however no significant association was observed between malnutrition and the etiology and prevalence of cirrhosis. Numerous factors contribute to the variability observed in the prevalence of malnutrition across various studies. These factors encompass differences in sample characteristics, such as heterogeneity and diversity in eating patterns, socio-economic position, co-morbidities, and medical care provided at hospitals. These variations can occur not only between different countries but also within the same country.

Limitations of the study

The study may have noteworthy limitations attributable to: the study was conducted at a single institution, therefore, further exploratory research at a multi-centre level is necessary in order to obtain a substantial and conclusive outcome. The limited size of the sample necessitates the undertaking of research with a bigger sample size in order to get statistically meaningful suggestions that can contribute to enhanced patient outcomes in individuals with chronic liver disease.

CONCLUSION

Severe malnourishment (as per SGA) was significantly more among CLD patients with CPS Grade C while severe malnourishment (as per SGA) was significantly more among CLD patients with Moderate and Severe MELD Grading. and Moderate and Severe MELD Na Grading.

Malnutrition is significantly associated with severity of chronic liver disease and SGA act as important tool for assessment of malnutrition in patients with chronic liver disease.

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References

1. RILEY III TR, Bhatti AM. Preventive strategies in chronic liver disease: part II. Cirrhosis. American family physician. 2001 Nov 15;64(10):1735-41.
2. Singal AK, Ong S, Satapathy SK, Kamath PS, Wiesner RH. Simultaneous liver kidney transplantation. Transplant International. 2019 Apr;32(4):343-52.
3. Lee DH, Son JH, Kim TW. New scoring systems for severity outcome of liver cirrhosis and hepatocellular carcinoma: current issues concerning the Child-Turcotte-Pugh score and the Model of End-Stage Liver Disease (MELD) score. Taehan Kan Hakhoe chi= The Korean Journal of Hepatology. 2003 Sep 1;9(3):167-79.

4. Poynard T, Mathurin P, Lai CL, Guyader D, Poupon R, Tainturier MH, Myers RP, Muntenau M, Ratziu V, Manns M, Vogel A. A comparison of fibrosis progression in chronic liver diseases. Journal of hepatology. 2003 Mar 1;38(3):257-65.
5. Kim WR, Biggins SW, Kremers WK, Wiesner RH, Kamath PS, Benson JT, Edwards E, Therneau TM. Hyponatremia and mortality among patients on the liver-transplant waiting list. New England Journal of Medicine. 2008 Sep 4;359(10):1018-26.
6. Visser R, Dekker FW, Boeschoten EW, Stevens P, Krediet RT. Reliability of the 7-point subjective global assessment scale in assessing nutritional status of dialysis patients. InAdvances in peritoneal dialysis. Conference on Peritoneal Dialysis 1999 Jan 1 (Vol. 15, pp. 222-225).
7. Kopple JD. National kidney foundation K/DOQI clinical practice guidelines for nutrition in chronic renal failure. American journal of kidney diseases. 2001 Jan 1;37(1):S66-70.
8. Lee DH, Son JH, Kim TW. New scoring systems for severity outcome of liver cirrhosis and hepatocellular carcinoma: current issues concerning the Child-Turcotte-Pugh score and the Model of End-Stage Liver Disease (MELD) score. Taehan Kan Hakhoe chi= The Korean Journal of Hepatology. 2003 Sep 1;9(3):167-79.
9. Stickel F, Hoehn B, Schuppan D, Seitz HK. Nutritional therapy in alcoholic liver disease. Alimentary pharmacology & therapeutics. 2003 Aug;18(4):357-73.
10. Hasse JM, Blue LS, Crippin JS, Goldstein RM, Jennings LW, Gonwa TA, Husberg BS, Levy MF, Klintmalm GB. The effect of nutritional status on length of stay and clinical outcomes following liver transplantation. Journal of the American Dietetic Association. 1994 Sep 1;94(9):A38.
11. Magdy M, Badawi R, Abd-Elsalam S. Validity of different nutritional assessment modalities as indicators of nutritional status in cirrhotic patients. J Liver Res Disord Ther. 2018;4(4):145-51.
12. De Mutsert R, Grootendorst DC, Boeschoten EW, Brandts H, van Manen JG, Krediet RT, Dekker FW. Subjective global assessment of nutritional status is strongly associated with mortality in chronic dialysis patients. The American journal of clinical nutrition. 2009 Mar 1;89(3):787-93.
13. Lim HS, Kim HC, Park YH, Kim SK. Evaluation of malnutrition risk after liver transplantation using the nutritional screening tools. Clinical nutrition research. 2015 Oct 1;4(4):242-9.
14. Topan MM, Sporea I, Dănilă M, Popescu A, Ghiuchici AM, Lupu oru R, irli R. Comparison of Different Nutritional Assessment Tools in Detecting Malnutrition and Sarcopenia among Cirrhotic Patients. Diagnostics 2022 Apr 3;12(4):893.
15. Hassan MS, Rehim AS, Khalil MA, Osman YA. Nutritional assessment of cirrhotic patients with variable severity. Journal of Current Medical Research and Practice. 2019 May 1;4(2):144-51.