THE PLANET

Original Article

Assessment of Nutritional Status and Exploration of Nutritional Concepts among Patients of Cirrhosis

Maniruzzaman Sarkar[1*], Jimma Hossain[2], Abdullah tareq bhuiyan[3]

ARTICLE INFO

Received: 5 Mar 2026
Accepted: 8 Mar 2026
Published Online: 17 Mar 2026

DOI: 10.5281/zenodo.19317734

Volume: 9, Number: 1, Page: 131-136

e-ISSN: 2789-5912
ISSN: 2617-0817

*Corresponding author

ABSTRACT

Background: Malnutrition is prevalent in patients with cirrhosis and has a substantial impact on morbidity and mortality. Lack of nutritional understanding, coupled with misconceptions and dietary myths about liver disease, exacerbates this issue. Owing to the scarcity of available data, this research aimed to evaluate the nutritional condition of hospitalized cirrhotic patients and to investigate their nutritional knowledge and perceptions. **Methods & Materials:** This descriptive cross-sectional study based in a hospital was carried out for six months within the inpatient Departments of Medicine and Gastroenterology at Rangpur Medical College Hospital following protocol approval. Cirrhotic patients who satisfied the inclusion and exclusion criteria were recruited following the acquisition of informed written consent. Data were obtained via clinical assessment, pertinent investigations, and a semi-structured questionnaire created by the researcher, then analyzed using SPSS version 23. **Results**: The average age was 47.25 ± 12.05 years, with a higher percentage of males (69%). The majority of patients came from lower middle-class backgrounds, with HBV being the primary cause (44.5%). Decompensated cirrhosis occurred in 77%, with Child–Pugh B being the most prevalent. Malnutrition impacted 52.8% as per RFH-SGA and was strongly correlated with disease severity, reduced education and socioeconomic status, and inadequate dietary knowledge ($p<0.05$). **Conclusion**: Nutritional status of one fourth to half of the patients of cirrhosis was not satisfactory as evidenced by rate of malnutrition detected by different assessment tools. It is related to both educational status, socio-economic condition as well as dietary knowledge of the patients.

Keywords: *Nutritional Status, Nutritional Concepts, Cirrhosis.*

1. *Assistant Professor, Department of Medicine, Nilphamari Medical College, Nilphamari, Bangladesh (ORCID: 0009-0003-1520-3142)*
2. *Principle, Department of Gastroenterology, Nilphamari Medical College, Nilphamari, Bangladesh (ORCID: 0009-0001-1415-5244)*
3. *Assistant Professor, Department of anesthesiology, Nilphamari medical college, Nilphamari, Bangladesh (ORCID: 0009-0004-2766-5296)*

INTRODUCTION

Cirrhosis, a final pathway for a wide variety of chronic liver diseases, is a pathologic entity defined as diffuse hepatic fibrosis with the replacement of the normal liver architecture by nodules and can have varied clinical manifestations and complications [1]. Cirrhosis is a major cause of mortality and morbidity worldwide [2]. Decompensated cirrhosis is the 14th most common global cause of death in adults, the 4th in central Europe and 8th in North America [3,4].

The major complications of liver cirrhosis include esophageal varices, ascites, hepatic encephalopathy (HE), malnutrition, hepatopulmonary syndrome, hepatocellular carcinoma (HCC), hepatorenal syndrome (HRS), spontaneous bacterial peritonitis (SBP), and coagulation disorders [5]. Malnutrition is frequently a burden in patients with liver cirrhosis, occurring in 20-50% of patients [6].

The progression of malnutrition is associated with that of progression of liver failure. Malnutrition has been reported in 20% of patients with compensated cirrhosis and with 50% of patients with decompensated cirrhosis [7]. Malnutrition is associated with higher rate of cirrhotic complications, such as recurrent and treatment resistant ascites, susceptibility to infections, hepatic encephalopathy, as well as being independent predictors of lower survival in cirrhosis and in patients undergoing liver transplantation [8-11].

Accurate assessment of nutritional status is often difficult to obtain in patients with cirrhosis [12]. Multiple techniques have been proposed to detect malnutrition in patients with cirrhosis. Although there is no gold standard for the assessment of malnutrition in patients with cirrhosis, anthropometric measurements such as Body Mass Index (BMI), Mid Arm Muscle Circumference (MAMC), and Triceps Skin Fold (TSF) are currently recommended by many study results and anthropometry can be comparable in accuracy to more sophisticated major tools [13,14].

Besides anthropometric tools, different global assessment tool is widely practiced to assess nutritional status of cirrhotic patients. Currently two global assessment tools naming Subjective Global Assessment (SGA) and Royal Free Hospital- Subjective Global Assessment (RFH-SGA), are recommended by both European Association for the Study of the Liver Diseases (EASLD)and American Association for the Study of Liver Diseases (AASLD) nutritional guideline [6,15]. Both of the tools include subjective as well as objective parameter to assess nutritional status. Overall, SGA has fair to good inter-observer reproducibility and is associated with various clinical and prognostic variables of liver transplantation [16,17].

A number of cirrhotic patients avoid some foods in their diet due to their poor dietary knowledge. These unnecessary dietary restrictions also contribute in malnutrition in these patients, which highlight the utmost need to improve their nutritional knowledge for their better outcome. To the best of our knowledge there are few studies in our country to explore nutritional concepts of cirrhotic patients. For the above reason our study aimed to explore patient's concepts and knowledge regarding diet in cirrhosis in addition to assess their nutritional status.

METHODS & MATERIALS

Study settings: This study was a descriptive cross-sectional investigation carried out in the Departments of Gastroenterology and Medicine at Rangpur Medical College Hospital over a six-month from July 2018 to December 2018.

Study population: The study included patients suffering from chronic liver disease who were admitted to the appropriate departments of Rangpur Medical College Hospital, totaling 110 patients in the study.

Selection criteria: A purposive sampling method that is non-probability was employed. Adult patients (≥18 years) with

chronic liver disease who were admitted to the appropriate departments and agreed to participate were included. Patients experiencing acute complications from cirrhosis, hepatocellular carcinoma, or other cancers, along with comorbid conditions or diseases that might notably impact nutritional status, were not included.

Study procedure: Following the approval from the Ethical Review Committee and acquiring written informed consent from all participants, sociodemographic and clinical data were gathered through in-person interviews utilizing a semi-structured questionnaire. The investigator conducted a nutritional assessment utilizing standard anthropometric measurements and RFH-SGA to eliminate interobserver variation, with data being recorded and analyzed through SPSS version 23.

Data analysis: The gathered data were checked for consistency and examined using SPSS v.23. Descriptive statistics (mean, frequency, percentage) encapsulated sociodemographic variables and dietary knowledge. Associations were evaluated using the chi-square test, with $p < 0.05$ regarded as statistically significant. Findings were displayed in tables, charts, and written format.

RESULTS

Table I shows that the study sample (n=110) was mainly middle-aged (41–60 years, 60%), male (69%), and largely from rural regions (61%). The majority of participants had low to moderate levels of education, with the largest segment holding an SSC (31.8%) and just 12.7% being graduates or above. The majority belonged to lower and lower-middle socioeconomic classes (81%), with predominant occupations being day laborers (24.5%) and housewives (18.3%), signifying a population primarily from rural, lower socioeconomic backgrounds with little education.

Table I
Sociodemographic Characteristics of Study Participants (*n*=110).

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–30	13	11.8
	31–40	18	16.4
	41–50	37	33.6
	51–60	29	26.4
	61–70	8	7.3
	>70	5	4.5
Sex	Male	76	69
	Female	34	31
Occupation	Government employee	12	10.9
	Private employee	15	13.6
	Businessman	19	17.3
	Housewife	20	18.3
	Day laborer	27	24.5
	Others	10	9.1
	Unemployed	7	6.4
Residence	Urban	43	39
	Rural	67	61
Educational qualification	Illiterate	21	19.10
	Primary	20	18.20
	SSC	35	31.80
	HSC	20	18.20
	Graduation and above	14	12.70
Socioeconomic status	Lower	42	38.20
	Lower middle	47	42.70
	Upper middle	13	11.80
	Upper	08	7.30

Table II presents most cirrhosis instances resulted from HBV (44.5%), followed by NASH (17.3%) and HCV (11.8%), with 13.6% of cases having an unknown cause. The majority of patients exhibited moderate to severe liver dysfunction (Child–Pugh B: 41%, C: 36%), with a large portion classified as decompensated (77%), suggesting the study group largely suffered from advanced liver disease.

Table II
Etiology, Severity, and Clinical Condition of Cirrhosis among Participants in the Study (*n*=110).

Variable	Category	Frequency (n)	Percentage (%)
Etiology of cirrhosis	HBV	49	44.5
	Unidentified	15	13.6
	NASH	19	17.3
	HCV	13	11.8
	Wilson's disease	6	5.5
	Others	5	4.5
	Alcoholic	3	2.7
Severity of cirrhosis (Child–Pugh)	A	25	23
	B	45	41
	C	40	36
Clinical Status of Cirrhosis	Compensated	25	23%
	Decompensated	85	77%

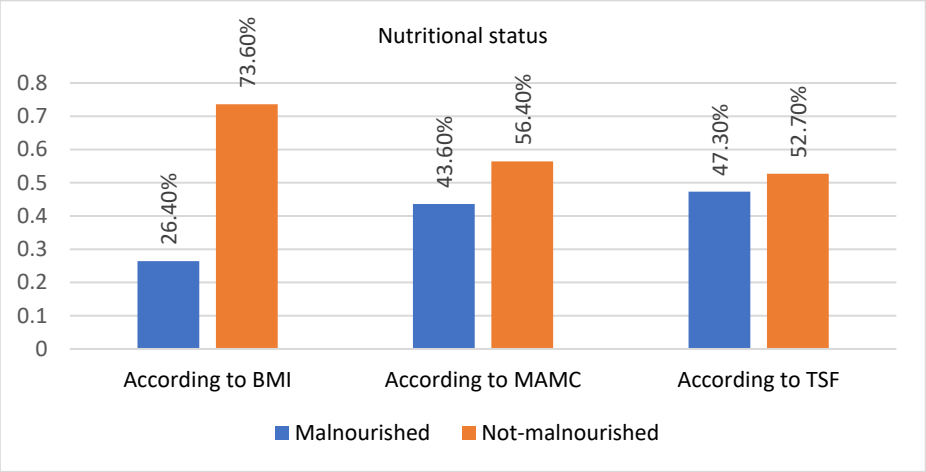

Figure 1 Nutritional Status of Patients Assessed by BMI, MAMC, and TSF

Figure 1 shows nutritional evaluation revealed 26.4% malnourished according to BMI, 43.6% by MAMC, and 47.3% by TSF, suggesting that MAMC and TSF identify more cases of malnutrition than BMI does.

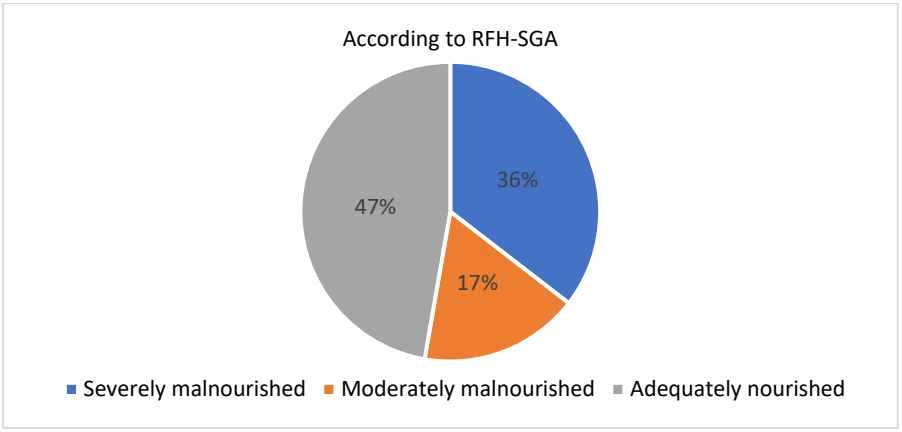

Figure 2 Nutritional Status of Patients According to RFH-SGA (*n*=110)

Figure 2 shows according to RFH-SGA, 35.5% of patients were severely malnourished, 17.3% were moderately malnourished, and 47.3% were adequately nourished, indicating that over half of the patients had some degree of malnutrition, highlighting the high prevalence of nutritional risk in this population.

Table III shows the connection between nutritional status and the severity of cirrhosis (Child–Pugh class) differed according to the assessment methods used. Utilizing RFH-SGA, malnutrition rose with disease severity: 24% in class A, 48.9% in B, and 60% in C (P=0.035). Likewise, MAMC and TSF demonstrated a notable increase in malnutrition as Child–Pugh class deteriorated (MAMC: 32% → 40% → 55%, P=0.025; TSF: 36% → 46.7% → 55%, P=0.042). On the other hand, BMI did not exhibit a notable correlation (P=0.512). The findings indicate that RFH-SGA, MAMC, and TSF are more effective than BMI in identifying malnutrition in advanced cirrhosis.

Table III
Association of Nutritional Status with Severity of Cirrhosis (Child–Pugh Class) Using Different Assessment Tools.

Tool	CP Group	Malnourished (n, %)	Not Malnourished / Adequately Nourished (n, %)	P value
RFH-SGA	A	6 (24)	19 (76)	0.035
	B	22 (48.89)	23 (51.11)	
	C	24 (60)	16 (40)	
MAMC	A	8 (32)	17 (68)	0.025
	B	18 (40)	27 (60)	
	C	22 (55)	18 (45)	
TSF	A	9 (36)	16 (64)	0.042
	B	21 (46.66)	24 (53.34)	
	C	22 (55)	18 (45)	
BMI	A	4 (16)	21 (84)	0.512
	B	11 (24.44)	34 (75.56)	
	C	4 (13.33)	26 (86.67)	

Table IV shows the patients' nutritional status was notably linked to both their educational qualification (P=0.031) and socioeconomic status (P=0.043). Malnutrition was more common in patients with less education, as 66.7% of illiterate individuals and 65% of those with a primary education experienced severe malnutrition, while only 14.3% of graduates or individuals with higher education faced the same issue. Likewise, individuals from lower socioeconomic backgrounds exhibited a greater incidence of severe malnutrition (64.3%) compared to those from higher socioeconomic backgrounds (12.5%). These results show that reduced education and lower socioeconomic status are significant risk factors for malnutrition in patients with cirrhosis.

Table IV
Association of Nutritional Status with Educational Qualification and Socioeconomic Status (*n*=110).

Variable	Category	Severely Malnourished n (%)	Moderately Malnourished n (%)	Adequately Nourished n (%)	P value
Educational qualification	Illiterate	14 (66.67)	2 (9.52)	5 (23.81)	0.031
	Primary	13 (65)	3 (15)	4 (20)	
	SSC	16 (45.71)	6 (17.14)	13 (37.14)	
	HSC	7 (35)	6 (30)	7 (35)	
	Graduation & above	2 (14.29)	2 (14.29)	10 (71.43)	
Socioeconomic status	Low	27 (64.29)	7 (16.67)	8 (19.05)	0.043
	Lower middle	19 (40.43)	9 (19.15)	19 (40.43)	
	Upper middle	5 (38.46)	2 (15.38)	6 (46.15)	
	Upper	1 (12.50)	1 (12.50)	6 (75)	

Table V shows only 40.9% received nutritional advice, mostly from doctors in hospitals; 73.3% got advice at each visit, and 62.2% followed it.

Table V
History and Compliance of Patients Regarding Nutritional Advice (n=110).

Variable	Category	Number	Frequency (%)	Total (n)
History of getting advice	Yes	45	40.90	110
	No	65	59.10	
From whom you get advice (among Yes, n=45)	Doctor	39	86.70	45
	Nurse	6	13.30	
From where you get advice (among Yes, n=45)	Hospital	33	73.30	45
	Private chamber	12	26.70	
Have you got dietary advice in each visit? (Among Yes, n=45)	Yes	33	73.30	45
	No	12	26.70	
Did you obey the advice? (Among Yes, n=45)	Yes	28	62.20	45
	No	17	37.80	

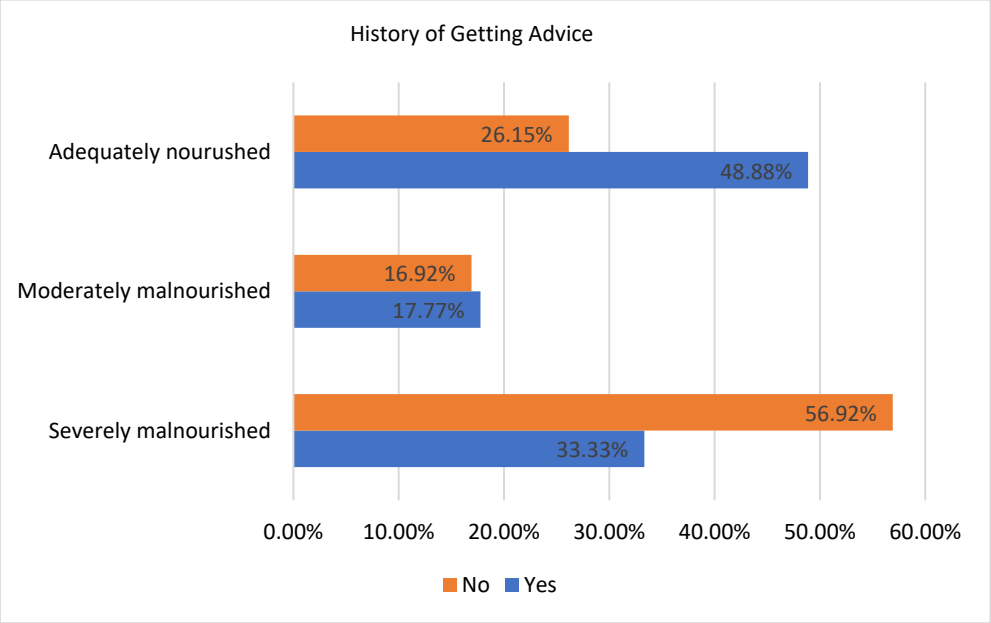

Figure 3 Association of Nutritional Status with History of Receiving Nutritional Advice (*n*=110)

Figure 3 shows patients who had previously received nutritional guidance demonstrated a notably lower incidence of severe malnutrition (33.3%) in contrast to those who had not received any advice (56.9%, P=0.030). This suggests that obtaining dietary advice is linked to improved nutritional health in the study group.

Table VI shows that enhanced dietary understanding correlated with better nutritional outcomes: for instance, among individuals aware of which foods to consume, 54.3% (19/35) were sufficiently nourished compared to 35.1% (20/57) in those lacking this knowledge (P=0.006). Consistently, sufficient dietary consumption significantly lowered severe malnutrition rates: 7.3% (3/41) compared to 61.4% (27/44) in the inadequate group and 88% (22/25) in the negligible intake group (P<0.001). This demonstrates that understanding and appropriate nutrition significantly enhance diet quality.

Table VI
Association of Dietary Knowledge and Dietary Intake with Nutritional Status of Patients (*n*=110).

Variable	Response	Adequately Nourished n (%)	Moderately Malnourished n (%)	Severely Malnourished n (%)	Total n (%)	P value
Dietary knowledge						
Do you avoid any food due to this disease?	Yes	23	6	10	39	<0.001
	No	16	13	42	71	
Do you know which foods you should take more?	Yes	19	7	9	35	0.006
	No	20	12	43	57	
Do you know how much kilo calories you need in each day?	Yes	22	6	12	40	0.004
	No	17	13	40	70	
Sufficient knowledge about salt intake	Yes	17	5	10	32	0.039
	No	22	14	42	78	
Sufficient knowledge about vitamin intake	Yes	19	8	11	38	0.018
	No	20	11	41	72	
Sufficient knowledge about diet frequency	Yes	26	6	12	44	<0.001
	No	13	13	40	66	
Sufficient knowledge about complementary food	Yes	22	6	9	37	<0.001
	No	17	13	43	73	
Dietary intake	Adequate	31	7	3	41	<0.001
	Inadequate	8	9	27	44	
	Negligible	0	3	22	25	

DISCUSSION

The present study included 110 patients with cirrhosis, with a mean age of 47.25 ± 12.05 years, consistent with previous studies by Sarin et al. (51.7 ± 9.2), Mukherjee et al. (47.7 ± 13.4), and Sajja et al. (52 ± 11) [18–20]. The majority of participants were male (69%) and female (31%), aligning with findings from Sharma et al. (69.7% male) and Trimukhe et al. (male: female 2.15:1) [21,22]. Occupational distribution revealed 10.9% government employees, 13.6% private employees, 17.3% businessmen, 18.3% housewives, 24.5%-day laborers, 9.1% other occupations, and 6.4% unemployed, comparable to Ahsan et al., who reported similar percentages across occupational categories [23]. Educational status showed that 19.1% were illiterate, 18.2% had primary education, 31.8% completed SSC, 18.2% HSC, and 12.7% had graduation or higher, reflecting trends reported by Ahsan et al. (2007) [23]. The majority of participants were from rural areas (61%), while 39% resided in urban regions, roughly consistent with Mendes et al., who reported 71.76% urban residency [24]. Socioeconomic distribution indicated that 38.2% belonged to the lower, 42.7% to the lower-middle, 11.8% to the upper-middle, and 7.3% to the upper class, closely aligning with previous reports [23].

Hepatitis B virus (HBV) was identified as the predominant cause of cirrhosis in this cohort (44.5%), followed by NASH (17.3%), HCV (11.8%), unidentified causes (13.6%), Wilson's disease (5.5%), other uncommon etiologies (4.5%), and alcoholic hepatitis (2.7%). This distribution is comparable to a large multicenter study of 770 cirrhotic patients, which reported HBV (49.2%), NASH (21.0%), HCV (14.7%), alcohol (4.0%), Wilson's disease (3.6%), autoimmune hepatitis (3.0%), and unknown causes (4.4%) [18,25]. In the present study, 77% of patients were decompensated and 23% compensated, with Child–Pugh class distribution of A (23%), B (41%), and C (36%), consistent with prior observations indicating predominance of advanced liver disease [13].

Assessment of nutritional status using RFH-SGA revealed 35.5% of patients were severely malnourished, 17.3% moderately malnourished, and 47.3% adequately nourished, yielding an overall malnutrition prevalence of 52.8%. Anthropometric measures identified malnutrition in 26.4% by BMI, 43.6% by MAMC, and 47.3% by TSF, indicating that MAMC and TSF were more sensitive than BMI in detecting malnutrition. These findings align with previous reports suggesting malnutrition prevalence ranging from 20% to 80% in cirrhotic populations and corroborate Sevastianos et al., who reported malnutrition in 54.2% of patients by RFH-SGA versus 18–44.6% by anthropometry [26].

Malnutrition prevalence increased with advancing disease severity. Using RFH-SGA, malnutrition was present in 24% of Child–Pugh A, 48.9% of B, and 60% of C patients (p = 0.035). Similar increasing trends were observed with MAMC (32%, 40%, 55%; p = 0.025) and TSF (36%, 46.7%, 55%; p = 0.042), whereas BMI showed no significant correlation with disease severity (p = 0.512), indicating the limited sensitivity of BMI in detecting malnutrition in advanced cirrhosis. These results are consistent with findings by Rana et al., who reported severe malnutrition in 27.8% of CP-A, 52.7% of CP-B, and 63% of CP-C patients [13].

Educational level and socioeconomic status significantly influenced nutritional outcomes. Severe malnutrition was most prevalent among illiterate patients (66.7%) and those with primary education (65%), decreasing progressively with higher educational attainment to 14.3% in graduates or higher (p = 0.031). Similarly, severe malnutrition was more frequent among individuals of lower socioeconomic status (64.3%) compared to those from upper-class backgrounds (12.5%) (p = 0.043). These trends are consistent with

Khan et al., who reported higher malnutrition rates in illiterate and low socioeconomic groups, with marked reductions among patients with higher education and socioeconomic status [27].

Nutritional counseling was provided to only 40.9% of participants, predominantly by doctors (86.7%) in hospital settings (73.3%), and adherence to advice was observed in 62.2% of cases. Patients who received nutritional guidance exhibited significantly lower rates of severe malnutrition (33.3% vs. 56.9%, p = 0.030), highlighting the beneficial impact of structured dietary counseling. El-Etreby et al. reported higher prevalence of dietary counseling (71.2%), mainly by physicians (93.3%), with differences in the setting of delivery [28].

Dietary knowledge and intake were strongly associated with nutritional status. Patients with awareness of foods to increase, caloric needs, and adequate salt, vitamin, and complementary food intake demonstrated significantly better nutritional outcomes ($p < 0.001$–0.006). Adequate dietary intake markedly reduced severe malnutrition (7.3% vs. 61.4% and 88% in inadequate and negligible intake groups, respectively, $p < 0.001$), indicating that both knowledge and implementation of appropriate nutrition are critical for maintaining nutritional health in cirrhotic patients [29–31].

CONCLUSION

Malnutrition is common among cirrhotic patients and increases with disease severity. RFH-SGA, MAMC, and TSF are more effective than BMI in detecting malnutrition. Lower education, socioeconomic status, poor dietary knowledge, and lack of nutritional counseling significantly worsen nutritional outcomes. Structured dietary guidance and adequate nutrition knowledge are associated with improved nutritional status, highlighting the need for routine assessment and targeted interventions in this population.

REFERENCES

1. Feldman M, Friedman LS, Brandt LJ. Sleisenger e Fordtran - Malattie gastrointestinali ed epatiche - Fisiopatologia, diagnosi e trattamento. 2018;28–35.
2. Maddrey WC. Update in hepatology. Ann Intern Med. 2001;134(3):216– 23.
3. Mokdad AA, Lopez AD, Shahraz S, Lozano R, Mokdad AH, Stanaway J, et al. Liver cirrhosis mortality in 187 countries between 1980 and 2010: A systematic analysis. BMC Med. 2014;12(1):145.
4. Lewis DR, Chen HS, Cockburn MG, Wu XC, Stroup AM, Midthune DN, et al. Early estimates of SEER cancer incidence, 2014. Cancer. 2017;123(13):2524–34.
5. Nusrat S, Khan MS, Fazili J, Madhoun MF. Cirrhosis and its complications : Evidence based treatment. 2014;20(18):5442–60.
6. EASL Clinical Practice Guidelines on nutrition in chronic liver disease. J Hepatol. 2018;(1);1–22.
7. Italian Multicentre Cooperative Project on nutrition in liver cirrhosis. Nutritional status in cirrhosis. J Hepatol. 1994;21(3):317–25.
8. Huisman EJ, Trip EJ, Siersema PD, Van Hoek B, Van Erpecum KJ. Protein energy malnutrition predicts complications in liver cirrhosis. Eur J Gastroenterol Hepatol. 2011;23(11):982–9.
9. Merli M, Lucidi C, Giannelli V, Giusto M, Riggio O, Falcone M, et al. Cirrhotic patients are at risk for health care-associated bacterial infections. Clin Gastroenterol Hepatol. 2010;8(11):979-985.e1.
10. Merli M, Giusto M, Lucidi C, Giannelli V, Pentassuglio I, Di Gregorio V, et al. Muscle depletion increases the risk of overt and minimal hepatic encephalopathy: Results of a prospective study. Metab Brain Dis. 2013;28(2):281–4.
11. Gunsar F, Raimondo ML, Jones S, Terreni N, Wong C, Patch D, et al. Nutritional status and prognosis in cirrhotic patients. Aliment Pharmacol Ther. 2006;24(4):563–72.
12. Morgan MY, Madden AM, Soulsby CT, Morris RW. Derivation and validation of a new global method for assessing nutritional status in patients with cirrhosis. Hepatology. 2006;44(4):823–35.
13. Rana M, Faisal M, Karim M, Siddique A, Ahmed D, Rajhan A. Assessment of Malnutrition in Cirrhotic Patients. Bangladesh J Med Sci. 2016;15(02):189–94.
14. Monsef WA, Mostafa I, Zaky D. Assessment of the Nutritional Status of the Egyptian Patient with End Stage Liver Disease Prior to Liver Transplantation. Open J Gastroenterol. 2014;04(04):159–69.
15. Tandon P, Raman M, Mourtzakis M, Merli M. A practical approach to nutritional screening and assessment in cirrhosis. Hepatology. 2017;65(3):1044–57.
16. Hasse J, Strong S, Gorman MA, Liepa G. Subjective global assessment: alternative nutrition-assessment technique for liver-transplant candidates. Nutrition. 1993;9(3):339–43.
17. Bakshi N, Singh K. Nutrition assessment and its effect on various clinical variables among patients undergoing liver transplant. HepatoBiliary Surg Nutr. 2016;5(4):358–71.
18. Sarin SK, Chari S, Sundaram KR, Ahuja RK, Anand BS, Broor SL. Young v adult cirrhotics: A prospective, comparative analysis of the clinical profile, natural course and survival. Gut. 1988;29(1):101–7.
19. Sajja KC, Mohan DP, Rockey DC. Age and Ethnicity in Cirrhosis. J Investig Med. 2014;62(7):920–6.
20. Mukherjee PS, Vishnubhatla S, Amarapurkar DN. Etiology and mode of presentation of chronic liver diseases in India: A multi centric study.PLoS One. 2017;12(10):1–13.
21. Sharma B, Marwah R, Raina S, Sharma N, Kaushik M, Kaushal SS. A study on the etiology of cirrhosis of liver in adults living in the Hills of Himachal Pradesh, India. Trop Gastroenterol. 2016;37(1):37–41.
22. Trimukhe R, Rai R, Wankhade N. Etiological and Clinical Spectrum of Liver Cirrhosis in Eastern Madhya Pradesh, India. J Clin Exp Hepatol. 2011;1(1):18.
23. Ahsan T, Ahsan M, Kamal MM, Hossain KJ, Haque ME, Islam SN. Lifestyle, Nutritional Status and Seroclinical Profile of Liver Cirrhotic Patients. Bangladesh Med J. 2007;36(2):44–7.
24. Dal Sasso Mendes K, Lopes NLC, Fabbris MA, De Castro-E-Silva Júnior O, Galvão CM. Sociodemographic and clinical characteristics of candidates for liver transplantation. ACTA Paul Enferm. 2016;29(2):128– 35.
25. Mahtab M, Das D, Rahim M A, Begum R., Alam S M, Moben A., Mamun A, Rahman S, & Akbar S. Nonalcoholic Steatohepatitis Challenges Hepatitis B Virus as the Leading Cause of Chronic Hepatitis in Bangladesh. Bangladesh Journal of Medicine, 2017.28(1): 24-27.
26. Sevastianos VA, Dourakis SP (2016) Malnutrition and Sarcopenia in Advanced Liver Disease. J Nutr Food Sci 6: 487. doi:10.4172/2155-9600.1000487
27. Khan PN, Wani FA, Ganai AM, Ahmad B. Nutritional Status and Lifestyle of Liver Cirrhotic Patients in Kashmir Research Article. 2017;8(6):33360-33365.
28. El-Etreby, Nabeeh AK, Moukhtar AAH, El-etreby SA, Ibraim AA. Exploration of Nutritional Concepts among Patients of Chronic Liver Diseases and Their Health Care Providers.Journal of Nutrition and Metabolism. 2017;(1):1-12.
29. Bémeur C, Desjardins P, Butterworth RF. Role of nutrition in the management of hepatic encephalopathy in end-stage liver failure. J Nutr Metab. 2010;2(10):1-2.
30. Sidiq T KN. Nutrition as a Part of Therapy in the Treatment of Liver Cirrhosis. J Nutr Food Sci. 2015;5(S11):1-5.
31. Lattanzi B, Ambrosio DD, Fedele V, Merli M. Nutritional Assessment and Management for Hospitalized Patients with Nutritional Assessment and Management for Hospitalized Patients with Cirrhosis. 2018;17(2):88-96