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EVALUATION OF NUTRITIONAL INTAKE IN PATIENTS WITH CHRONIC LIVER DISEASE BY USING BMI, SGA AND 24-HOUR DIETARY RECALL OVER 3 CONSECUTIVE DAYS

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ABSTRACT

The Liver is a vital, regenerative organ performing over 500 functions, primarily focused on detoxification, metabolism and energy storage. It also filters blood from the digestive tract, breaks down fats via bile production and converts glucose to glycogen for energy storage and metabolizes drugs and toxins. Liver cirrhosis is the irreversible scarring (fibrosis) of the liver caused by long-term damage often from chronic hepatitis, alcohol overuse or fatty liver disease. Liver helps to metabolize protein, carbohydrate and fats in the body, that is the reason, the diet pattern of a person get affected.This study was conducted to assess the nutritional status of liver cirrhosis patients in SGRD medical college and hospital where patient's health, nutritional intake and diet pattern was going through many complex changes. **Methods ::** Data on age, demographic distribution, food choices, 24 hrs diet recall was recorded. A Total of 198 patients from 19 yrs to 70 yrs of both males and females having confirmed cases of liver cirrhosis were selected randomly for this purpose from general medicine and gastroenterology department OPD and interview sessions after taking written informed consent from every participant for collection of information.**RESULTS::** A total of 198 patients, 67% were male and 33% were females. The mean score of age, BMI , calorie and protein intake were (52.16±14.321), (17.5±3.472), (1303.45±363.788), (34.77±14.82)

respectively. 56% patients were underweight (BMI was less than 19), only 27% were normal while 17% were overweight (BMI more than 29). sarcopenia was very common among those patients (SGA score A was present in 37 % , SGA-B was in 51% and SGA-C was in 12% patients) due to liver cirrhosis condition. **CONCLUSION:: L**iver cirrhosis affects anthropometry , dietary and clinical outcomes of the patient, early diagnosis and prevention can result in slow progression of disease and less sarcopenia.

KEYWORDS: Liver cirrhosis, Diet, pathology,nutrition,sarcopenia.

INTRODUCTION: Liver has essential physiological functions in food digestion, absorption of nutrients and metabolism, playing a central role in the maintenance of a healthy nutritional status. Patients with chronic liver disease (CLD) suffer from a significant impairment of these functions, which may result in protein-calorie malnutrition (PCM)(Ferriara et al 2013).

Malnutrition is one of the most important complications and prognosis factors in cirrhosis. The prevalence of its development is estimated at more than 50 percent of patients with advanced cirrhosis, although the reported prevalence ranges between 5% and 90% depending on the assessment method employed [Naqvi H et al 2013].

More importantly, malnutrition in cirrhosis is linked to significantly poorer clinical outcomes. Researchers have determined that malnutrition in cirrhotic patients increases the likelihood of hospitalizations and death by about 2 to 2.5 times in comparison with well-nourished patients. Malnutrition is also a predisposing factor for severe complications like infections and hepatic encephalopathy, and it is frequently associated with sarcopenia and frailty, making the total number of problems even worse [Riebeiro H et al 2018]. Consequently, malnutrition is no longer viewed as being at the periphery of hepatological disorders, but it is regarded in the latest medical literature as a direct complication of cirrhosis, thus requiring early recognition and management [Santangeli E et al 2024]. This is to say that nutritional status should be equally considered alongside the management of portal hypertension and other traditional complications if we want to better the prognosis for patients.

Since malnutrition is quite common in cirrhotic patients and has significant clinical consequences, providing early nutritional interventions would be beneficial. The argument for earlier intervention is that waiting until a patient is already suffering from severe protein–calorie malnutrition and loss of muscle mass is likely to worsen clinical outcomes, as the intervention targets an entrenched clinical risk factor in this patient group (Iwasa M et al 2013). New evidence indicates that proactive nutrition therapy (provided by a

multidisciplinary team) is capable of enhancing both the survival rate and quality of life in patients with cirrhosis [Reuter B et al 2019].

Before recommending nutrition prescription it is important to get the patient's dietary information pertaining to tolerance to specific foods, allergens, specific preferences, dietary practices and recent changes in food intake. A qualitative and quantitative dietary assessment can b e done by using 24 hrs dietary recall of at least two days-one weekend and one week day. Dietary history should include increases or decline in food intake, skipping of meals and comprehensive use of FFQ (food frequency questionnaire) can give better understanding of consumption of outside foods, meal timing including professional constraints, practicality to follow the diet pattern to be considered. Non dietary and lifestyle habits such as tobacco consumption, alcohol and other substance abuses should be noted and a supportive program for cessation of such habits should be initiated.

Nutritional diagnosis is an important step between nutrition assessment and nutrition intervention. Nutritional concerns in patients with CLD are multifaceted and treating such malnutrition in these patients is tough. (Mandato C et al 2013). All types of liver dysfunctions are linked with the state of protein-energy malnutrition . Patients with CLD must adhere to a typical diet with the addition of supplements as required.(Marco S et al 2015). Malnutrition in liver diseases and its complications affect most patients and relates to undernutrition. Nutrition intervention , counselling alone or in combination with oral nutrition supplement is an effective first-line intervention. Supplemental enteral nutrition (EN) using a standard whole protein formula should be given when patients with liver dysfunctions cannot meet their nutrition requirements from normal foods despite adequate individualized nutritional counselling (Silva M et al 2015).

MATERIALS AND METHODS: A cross sectional study was conducted on a total of 198 patients both male and female selected from general medicine dept in SGRD medical college and hospital, Amritsar.

Ethical approval and Consent to participate: The study was approved by the Institutional Ethical Committee of Sri Guru Ram Das Institute Of Medical Sciences and Research, Amritsar, Punjab, India under approval no **SGRD/IEC/2025/458.** A written informed consent was obtained from all the participants.

Tools for the data collection: For the purpose of nutritional status evaluation, every participant underwent nutritional assessment tools like anthropometry, biochemical and dietary history by using 24 hrs dietary recall from last three consecutive days. Questions were

asked either from the patients or their care takers about their dietary intake and food habits. They were also assessed for BMI and SGA rating to check stage of sarcopenia and malnourishment. Their results were calculated by using latest version of IBM SPSS 27. Patients with medication with corticosteroids which has an important impact on body composition, any type of malignancy and lack of compliance with follow-up medical consultations and therapies were excluded from the study.

RESULTS AND DISCUSSION:: Table 1 shows that out of total 198 participants, 67% were male and 33% were female, all patients have history of liver cirrhosis, sarcopenia was very common in SGA Score A 51.8%, SGA Score B in 38.8% , SGA Score C in 10.2% and BMI was less than 18.5kgm2 in more than 56% , they were found underweight while 27% were in normal category, only 17% were overweight.

Table 1: Statistical distribution of various variables in frequency and percentage.

Variables	Frequency	Percentage (%)
COL Yes No	197 1	99.9 1.2
Male Female	132 66	67 33
BMI <18.5 18.5-24.9 24.9-30.3 >30.3	130 53 10 5	56 27 10 7
SGA A Score B Score C Score	102 76 20	51.8 38.8 10.2

Table 2 shows 24 hours dietary recall for day 1 for food intake. All meals were calculated in terms of calories, proteins, carbohydrates and fats. Minimum energy intake was 485kcals and maximum was 3652kcals/day and mean was 1303±367.722 for day 1. Average intake of proteins was minimum 5gm and maximum was 88gm per day while its mean was 34.77±14.82. On the other side average Carbohydrate and fats were minimum 74gm, and 5gm, maximum was 856gm and 85gm and its mean was 255.95±131.934 and 20.64±11.16gm for Day 1 recall of food intake in all mealtimes.

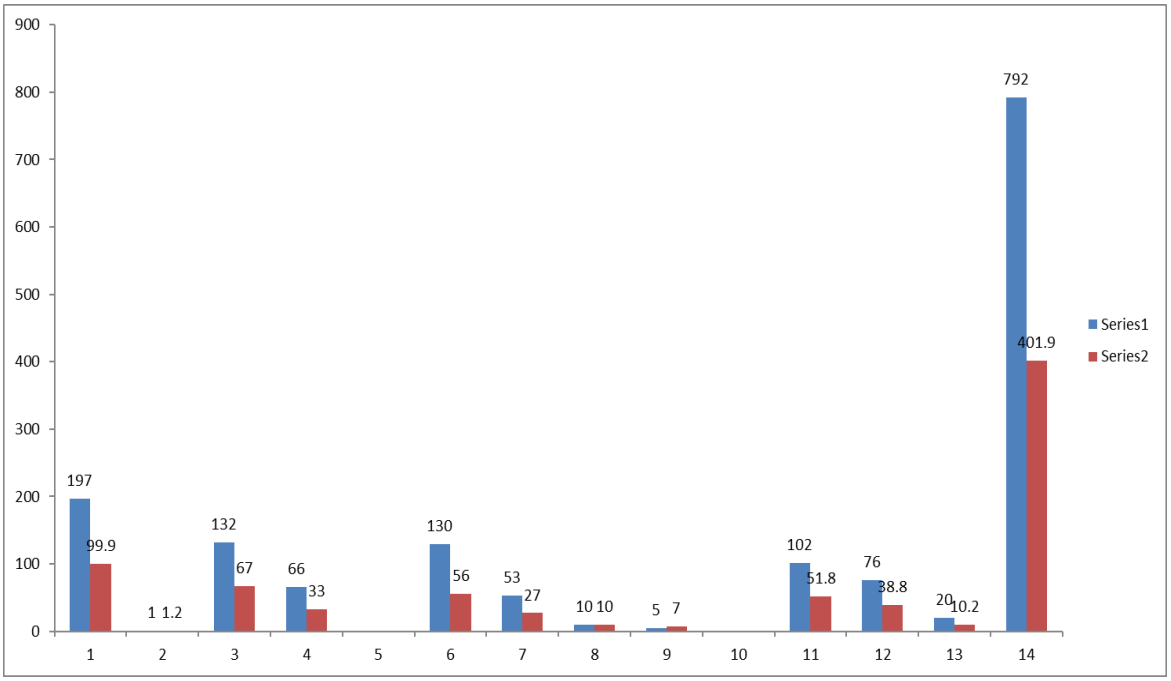


Table 2: Descriptive analysis of energy,protein,carbohydrates and fats for Day. 1 (n=198)

Variables	Minimum	Maximum	Mean±SD
Energy (kcals/day)	485	3652	1303.2±367.722
Proteind (gm/day)	5.0	88.0	34.77±14.82
Carbohydrates(gm/day)	74	856	255.95±131.934
Fats (gm/day)	5.0	85.0	20.64±11.16

In Day 2 recall it was found that average intake of calories and proteins were minimum 547kcals and 10 gm and maximum was 3201kcals and 88gm and mean of both nutrients were 1439.32±390.128 and 36.07±14.95 gm. Other two nutrients were also on minimum for carbohydrates and fats were 95gm and 8gm and maximum was 487gm and 66gm and its mean was 225.21±84.778 and 27.52±12.32gm for Day 2. (Table 3)

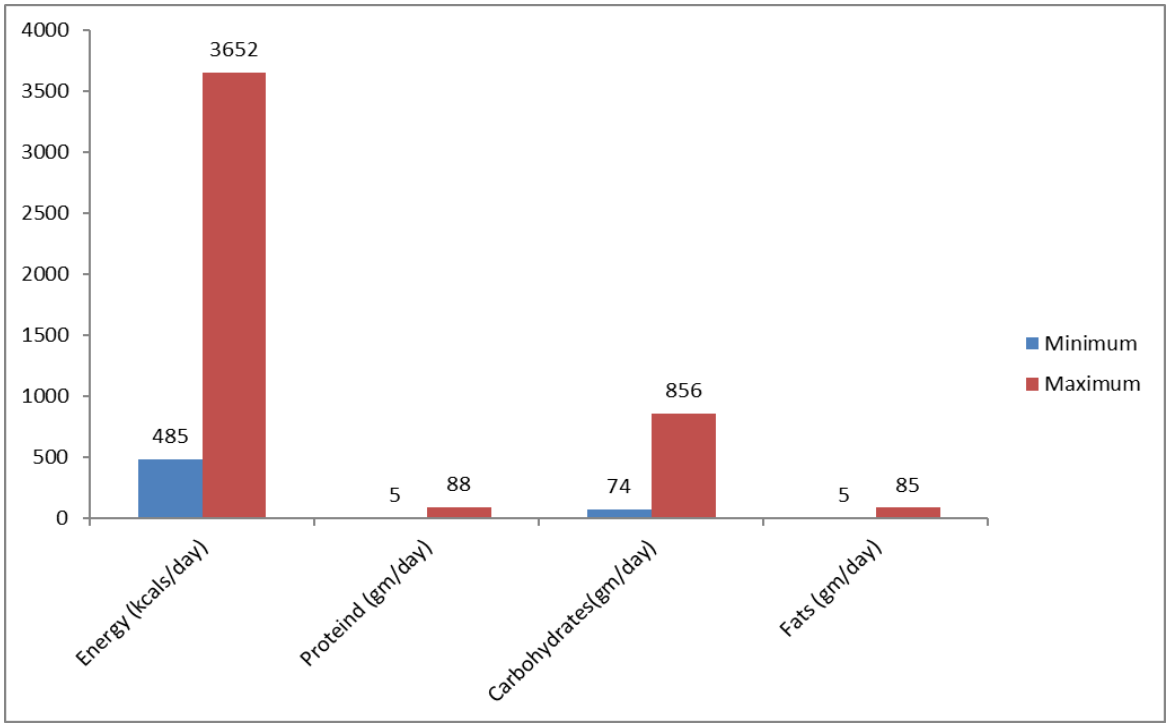


Table 3: descriptive analysis of energy,proteins,carbohydrates and fats for Day 3. (n=198)

Variables	Minimum	Maximum	Mean±SD
Energy (kcals/day)	547	3201	1439.32±390.128
Proteins (gm/day)	10.0	88.0	36.07±14.95
Carbohydrates(gm/day)	95	487	225.21±84.778
Fats (gm/day)	8.0	66.0	27.52±12.32

On recall of Day 3 it was recorded for all four nutrients on average, for calories,proteins, carbohydrates and fats, minimum intake was 547kcals, 10 gm, 95gm and 8gm while maximum intakes were 3201kcals,88gm,487gm and 66gm. Mean intake for these were 1439.32±352.221, 36.07±12.32, 225.21±421.23 and 27.52±15.62gm for Day 3. (Table 4)

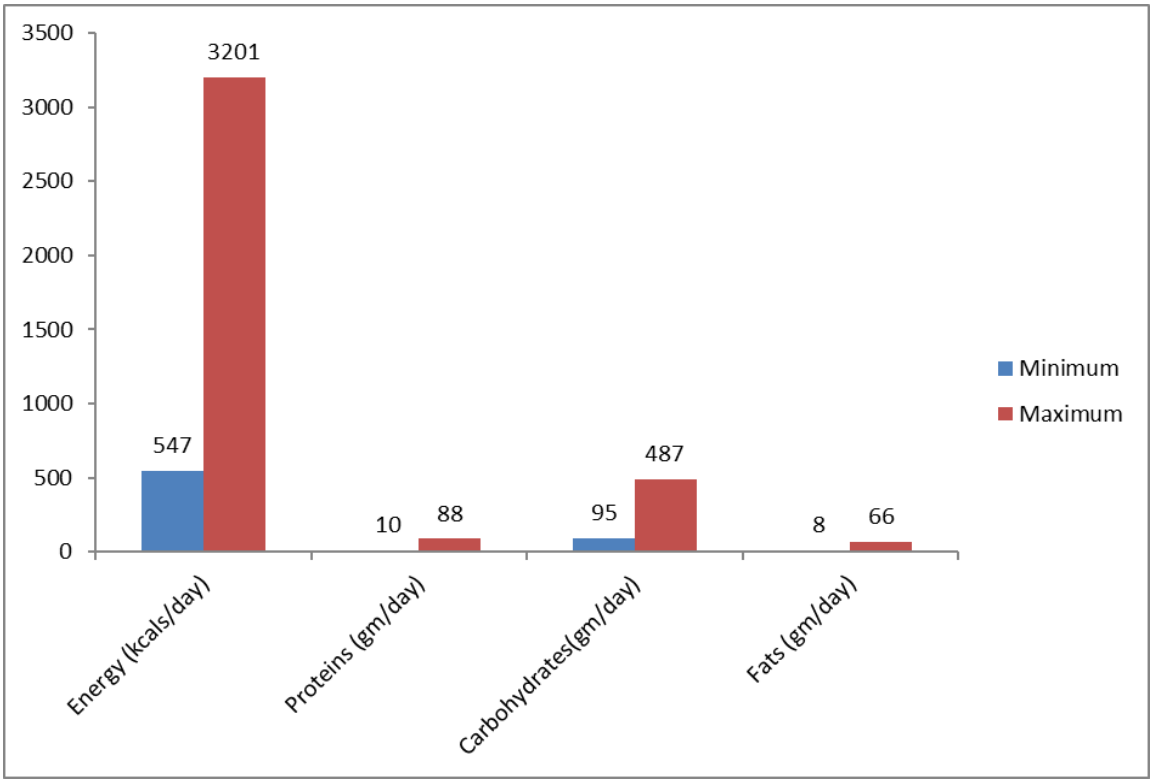


Table 4: Descriptive analysis of energy,proteins,carbohydrates and fats for Day3. (n=198)

Variables	Minimum	Maximum	Mean±SD
Energy (kcals/day)	547	3201	1439.32±352.221
Proteins (gm/day)	10.0	88.0	36.07±12.32
Carbohydrates(gm/day)	95	487	225.21±421.23
Fats (gm/day)	8.0	66.0	27.52±15.62

When 24 hours dietary recall of 3 consecutive days were compared with anthropometric variables. Mean rank of BMI was compared with day 1 dietary intake and these four nutrients were not statistically different in various categories of BMI. In underweight category BMI <18.5kgm2, mean rank of calories , protein, CHO and fat was 91.10, 96.17,84.26 and 118.21. In other categories where BMI was 18-22kgm2 (Normal) and 22-29kgm2 (overweight) and >29kgm2 (obesity) , sample size was 35, 77,54 and 32 in all four nutrient intakes , mean rank for energy component was 98.86, 97.15, 116.76 while for protein component, mean rank was 99.68, 90.17 and 120.89, for CHO component mean

rank was 98.42,105.62 and110.40, and fats component had mean rank of 101.61,87.57 and97.26 which is not statistically significant. (Table 5)

Higher the mean rank means the better performance. It is applicable after Bonferroni correction or Kruskal Wallis test.

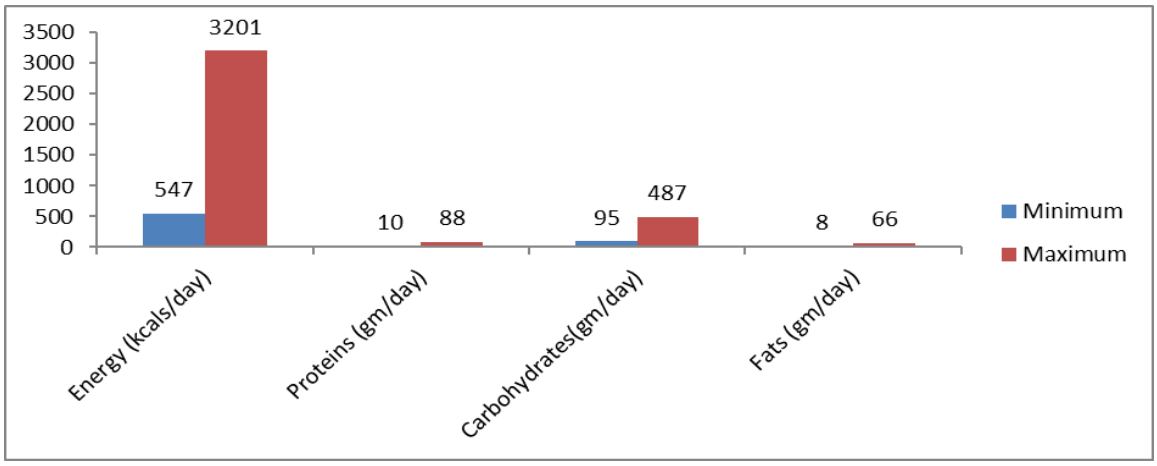


Table 5: Comparison of mean rank of BMI with 24 hrs recall of Day 1.

Ranks			
	BMI category	N	Mean Rank
Energy/Day1	<18.5	35	91.10
	18-22	77	98.86
	22-29	54	97.15
	>29	32	116.76
	Total	198	
Protein/Day1	<18.5	35	96.17
	18-22	77	99.68
	22-29	54	90.17
	>29	32	120.89
	Total	198	
CHO/ Day1	<18.5	35	84.96
	18-22	77	98.42
	22-29	54	105.62
	>29	32	110.44
	Total	198	
Fat/Day1	<18.5	35	118.21
	18-22	77	101.61
	22-29	54	87.57
	>29	32	97.26
	Total	198	

Mean rank of BMI was compared with day 2 dietary intake only three nutrients were not statistically different in various categories of BMI while mean rank for BMI with 24 hours dietary recall for 3 days were compared and it shows that n CHO/D2- Statistically

difference present in category <18.5 and 18-22 at p=0.037. Here, the mean rank for <18.5=83.06 and mean rank of 18-22= 115.59, category 18-22 outperform/consume higher CHO as compare to <18.5. In underweight category BMI <18.5kgm2, mean rank of calories , protein, CHO and fat was 95.77, 103.61, 83.06 and 96.21. In other categories where BMI was 18-22kgm2 (Normal) and 22-29kgm2 (overweight) and >29kgm2 (obesity) , sample size was 35, 77,54 and 32 in all four nutrient components , mean rank for energy component was 104.97, 89.50 and 110.05 while for protein component, mean rank was 103.92, 85.44, 110.86 and for CHO component mean rank was 115.59, 82.81 and 109.73 which is statistically significant and fats component had mean rank of 108.25, 92.89 and 95.67 which is not statistically significant. (Table 6)

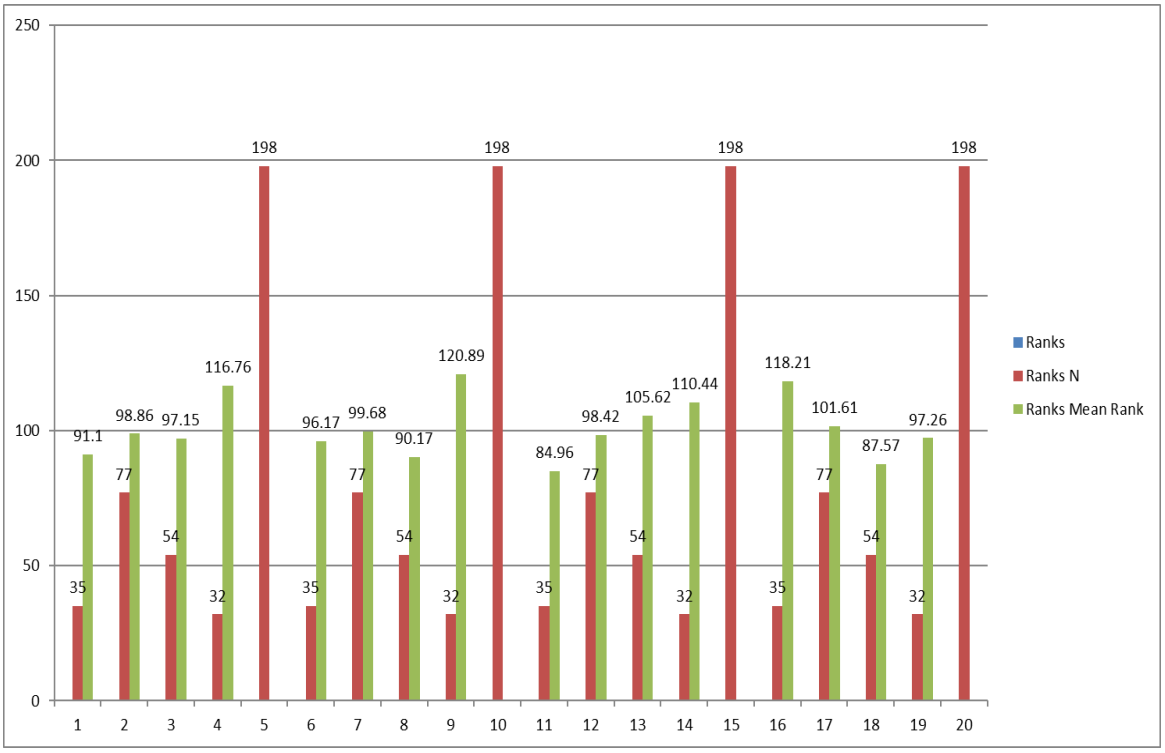


Table 6: Comparison of mean rank of BMI with 24 hrs recall of Day 2.

Energy/Day2	<18.5	35	95.77
	18-22	77	104.97
	22-29	54	89.51
	>29	32	110.05
	Total	198	
Protein /Day2	<18.5	35	103.61
	18-22	77	103.92
	22-29	54	85.44
	>29	32	110.86
	Total	198	

CHO/ Day2	<18.5	35	83.06
	18-22	77	115.59
	22-29	54	82.81
	>29	32	109.73
	Total	198	
Fat/Day2	<18.5	35	96.91
	18-22	77	108.25
	22-29	54	92.89
	>29	32	95.67

Total 198

Mean rank of BMI was compared with day 3 dietary intake only three nutrients were not statistically different in various categories of BMI while mean rank for BMI with 24 hours dietary recall for 3 days were compared and it shows that n protien/Day3- Statistically difference present in category <18.5 and 18-22 at p=0.037. Here, the mean rank for <18.5=118.66 and mean rank of 18-22= 102.24, category BMI 18-22 who were in normal category were consuming higher proteins as compared with 22-29 BMI category where they consumed only 79.06 gm of proteins which is statistically significant where normal patient consumed higher proteins as compared to overweight patients. That shows inportance of proteins in maintaining ideal body weight and ideal BMI also. In underweight category BMI <18.5kgm2, mean rank of calories , protein, CHO and fat was 104.12, 118.12,103.24 and 101.99. In other categories where BMI was 18-22kgm2 (Normal) and 22-29kgm2 (overweight) and >29kgm2 (obesity) , sample size was 35, 77,54 and 32 in all four nutrient components , mean rank for energy component was 98.45, 89.60 and 115.61 while for protein component, mean rank was 102.84,79.06 and 107.85 and for CHO component mean rank was 101.59, 92.35 and 104.79 which is statistically significant and fats component had mean rank of 108.86, 88.71 and 95.70 which is not statistically significant. (Table 7)

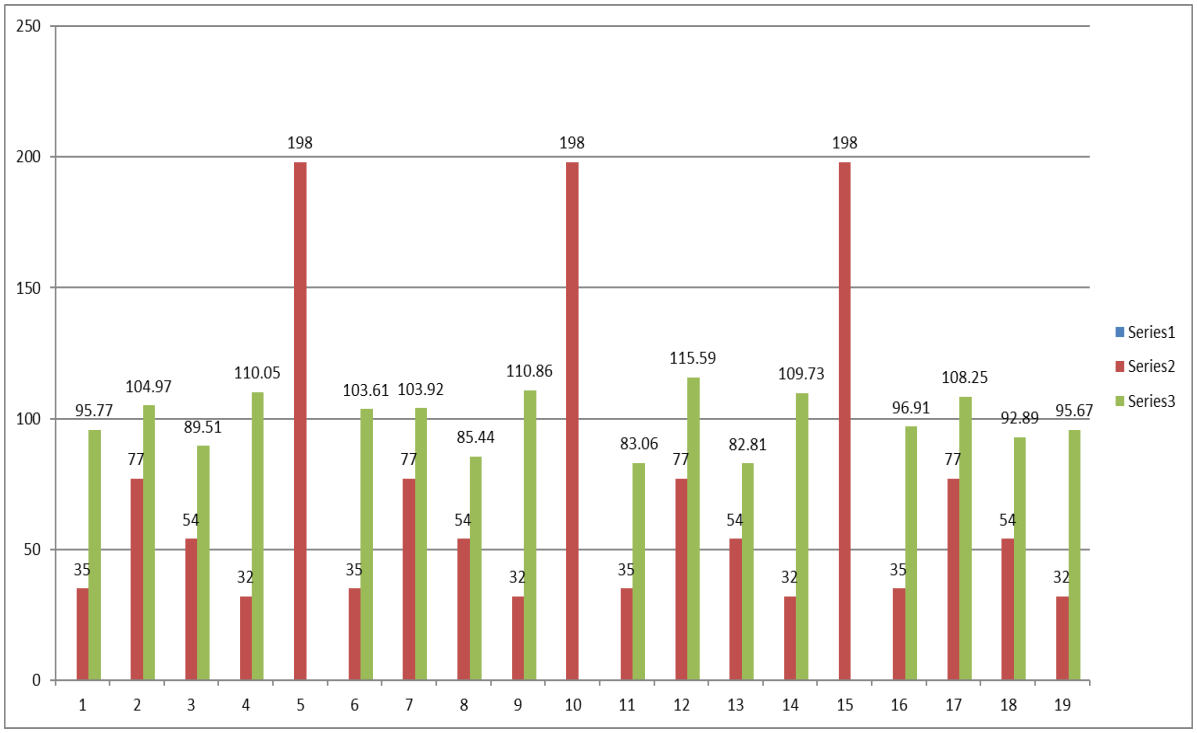


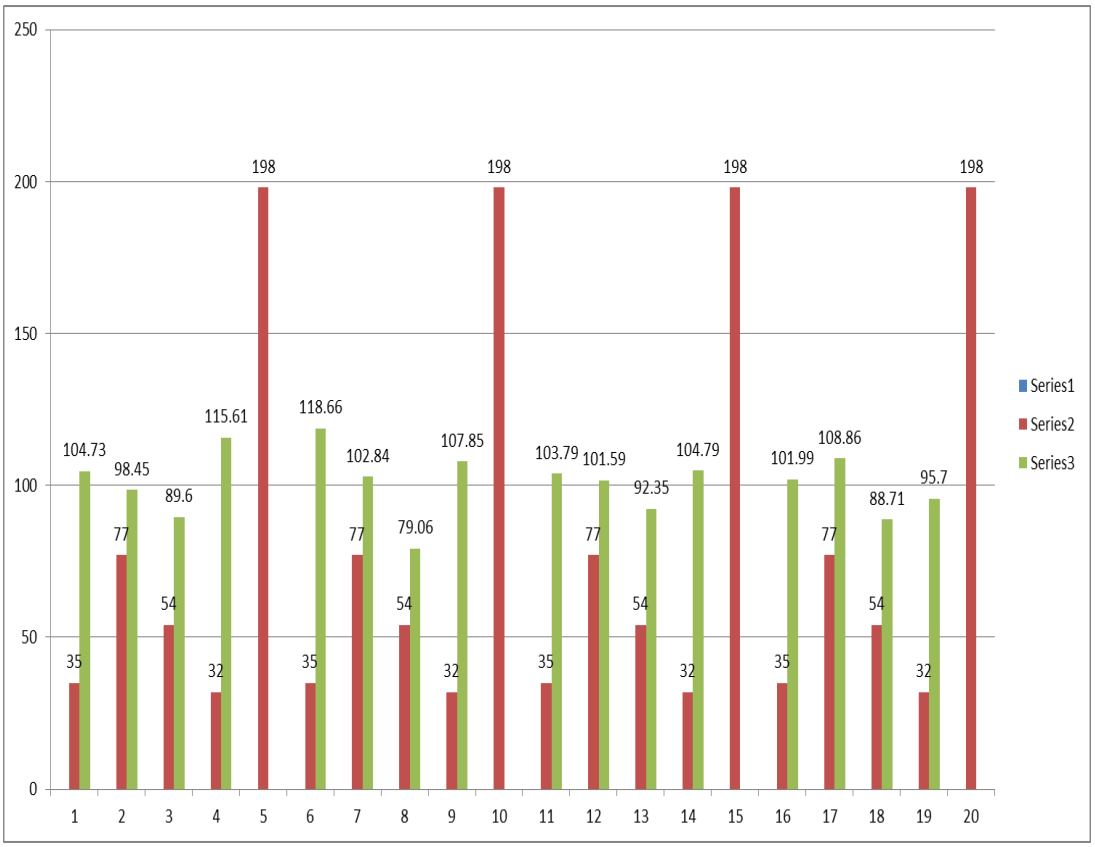
Table 7: Comparison of mean rank of BMI with 24 hrs dietary recall of Day 3.

Energy /Day3	<18.5	35	104.73
	18-22	77	98.45
	22-29	54	89.60
	>29	32	115.61
	Total	198	
Protein /Day3	<18.5	35	118.66
	18-22	77	102.84
	22-29	54	79.06
	>29	32	107.85
	Total	198	
CHO/ Day3	<18.5	35	103.79
	18-22	77	101.59
	22-29	54	92.35
	>29	32	104.79
	Total	198	
Fat/Day3	<18.5	35	101.99
	18-22	77	108.86
	22-29	54	88.71
	>29	32	95.70
	Total	198	

CONCLUSION

With this experience, protein calorie malnutrition (PCM) is common in CLD patients, those with advanced liver disease tend to be more severely malnourished and alcohol consumption may play a very important causative role. Malnutrition defined by anthropometric and SGA is

more prevalent in hospitalized CLD patients and contributed to a poor prognosis both in a hospital and in ambulatory setting. The present results shows that SGA is accurate to detect malnutrition in CLD. Further 24 hour dietary recall seems to be the most efficient parameter to assess nutritional status in these patients and is clearly associated with a poor outcome. Further studies are needed to evaluate the true importance of functional status. As a rule, CLD patients have high risk of malnutrition and therefore, nutritional assessment is mandatory in their routine care.



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