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Does Subjective Global Assessment have a role to play in patients with chronic liver disease

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ABSTRACT

Malnourishment is common in patients with chronic liver disease and is also highly neglected aspect. We tried to estimate the prevalence of malnourishment in relation to chronic liver disease using Subjective Global Assessment (SGA) and its role as a screening test for malnourishment. We also want to compare nutritional status with severity of chronic liver disease.METHODS: This is a cross-sectional, observational study done at Meenakshi Medical College Hospital and Research Institute, Kanchipuram. Patients with Chronic Liver disease (CLD) above 18 years of age were included. Patients of age less than 18 years, patients with other causes of malnourishment including carcinomas, immunocompromised patients, poorly controlled diabetes were excluded. All patients included in the study were subjected to SGA and routine blood tests for disease staging.RESULTS: After exclusion of 7 patients out of 54, 47 were included. Mean age was 51.6 ± 12.6 years. 89% males, 10% females. 70.2% were malnourished (SGA class B and C). 98% belongs to lower socio-economic status (SES) by Modified Kuppuswamy classes (IV and V). 68.1% were alcoholics, 10.6% had Hepatitis B, 8.5% had non-alcoholic fatty liver disease. 61.7% had disease duration of 13 – 59 months. 25.% had duration of illness > 60 months. 46.8% had normal Body mass index (BMI) (18.1 – 22.9). 27.7 % were underweight (BMI < 18). 23.4% were Obese (BMI > 25). 10.6%, 31.9% and 57.4% belonged to Child-Pugh class A, B and C respectively. 61.7% had Model for end stage liver disease – sodium (MELD-Na) score of > 15. Average MELD-Na score was 18.9. A statistical significance of SGA with BMI, Duration of illness and Child-Pugh class was observed. Although clinical significance was observed for SGA with etiology of chronic liver disease, MELD-Na score, SES, there was no statistical significance.CONCLUSION: SGA is an easy and cheap bedside screening tool to know who are malnourished and classify them according to the severity of malnourishment. Further investigations to conform malnourishment can be planned according to SGA. SGA also associates well with the severity of the disease. SGA should be incorporated into every patient's management algorithm.

Keywords: Nutrition, Malnourishment, Subjective Global Assessment, Cirrhosis, Chronic liver disease.

1. INTRODUCTION

Liver plays an important role in maintaining nutrition of an individual. This function is severely disturbed in chronic liver disease due to many factors. This is the reason why

malnourishment is common in patients with chronic liver disease (CLD). Prevalence of malnourishment in studies varies between 5% to 99% of patients with CLD [1]. It includes both undernutrition and overnutrition. A condition called sarcopenic obesity is seen in obese patients with cirrhosis, where adipose tissue is gained and muscle tissue is lost. Nutrition plays an important role in morbidity and mortality in a patient with CLD [1,2,3,4]. Malnourishment is associated with longer hospital stays, higher complication rates like hepatorenal syndrome, ascites, infections and so on. [5]. It is often neglected by the attending physicians [13]. Many prognostic models like Child-Pugh (CP) class and Model for end-stage liver disease-Sodium (MELD-Na+) score does not include functional status and nutritional assessment. There are many tools to calculate nutritional status in cirrhotics which can be done easily on bedside. Subjective global assessment (SGA) is such a tool which incorporates history, performance status and physical examination findings. SGA was initially used to assess nutritional status in surgical patients for postoperative infections. SGA provides an indication for definitive assessment of malnourishment. SGA classifies patients according to their malnourishment severity [4,6]. It categorizes patients into well nourished (A), mild to moderately malnourished (B) and severely malnourished (C) [6]. SGA is useful even when used by inexperienced persons and can be used by junior doctors and first year residents [7]. SGA has high interobserver agreement and can be reproducible [6]. Knowing the nutritional status is important as it correlates well with the severity of the liver disease [8,9]. Nutritional status adds up to the routinely used severity indices CP grade and MELD-Na score [10]. Improvement in the nutritional status improves the clinical outcomes in severely ill patients [11]. SGA also helps in predicting short term survival in cirrhotic patients [12].

Severity of malnourishment depends on etiology of CLD, alcohol being able to cause more malnourishment than other causes [8,13]. Malnourishment in alcoholic liver disease have multiple mechanisms. Loss of appetite, vomiting, vitamin malabsorption, decreased food intake, direct toxin effect. Malnourishment in non-alcoholic fatty liver disease (NAFLD) is more of mitochondrial dysfunction and decreased energy synthesis. Steatosis also leads to chronic inflammatory state, insulin resistance. Malnourishment is usually reversible with proper nutritional support, and patients should be managed nutritionally while treating the underlying disease. SGA is able to predict mortality in patients who are on liver transplant wait list [14,15]. Malnourishment in cirrhosis is associated with increased complications of hepatic encephalopathy [16].

2. AIMS

In this study, we want to find whether SGA can be used as a screening test for malnourishment in chronic liver disease. We also want to find whether SGA can be associated with severity of the liver disease.

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3. MATERIALS AND METHODS

This is a cross-sectional observational study, done at Meenakshi medical college hospital and research institute, Tamilnadu, India.

Patients:

All the patients with CLD, attending both outpatient and inpatient departments from March 2019 to November 2020 were enrolled in the study. Inclusion criteria: Age more than 18, who have chronic liver disease at various stages. Patients with other causes of malnourishment like carcinomas, immune deficiency states, tuberculosis, poorly controlled diabetes, other chronic diseases like chronic kidney disease were excluded. A detailed history is obtained regarding socio economic status, duration of illness, alcohol intake, smoking and so on.

Socio-economic status:

Socio-economic status was classified according to modified Kuppuswamy scale into upper class (I), upper middle class (II), lower middle class (III), upper lower class (IV). Lower class (V).

Subjective Global Assessment:

There are various modified versions of SGA questionnaire like Patient generated-SGA and so on. Original SGA described by Detsky et al., was used [6]. SGA is a screening test to identify whether a patient has malnourishment. SGA incorporates 1. Weight/ Diet change history, 2. Gastrointestinal symptoms, 3. Functional status and 4. Physical examination (focused on loss of subcutaneous fat, muscle wasting, Ascites and Edema). SGA classifies a patient into well nourished (A), mild – moderate malnourished (B) and severely malnourished (C).

Anthropometric calculation:

Body mass index (BMI) for Asian population, expressed as kg/m2, was calculated for every patient. Patients were classified as Underweight (BMI < 18), Normal (BMI: 18.1 – 22.9), Overweight (BMI: 23 – 24.9) and Obese (BMI > 25). A dry weight was calculated by removing 5% of total weight for mild ascites, 10% for moderate ascites, 15% for severe ascites, 20% for severe ascites and pedal edema.

Disease severity grading:

Routine blood investigations (serological and biochemical parameters), endoscopic and imaging studies were done for grading the severity of the disease. Severity of the disease is graded by Child-Pugh class and Model for end-stage Liver Disease-Sodium (MELD-Na+) score. Child-Pugh class incorporates serum bilirubin, serum albumin, International normalized ratio, ascites, hepatic encephalopathy. Grades of A (compensated cirrhosis),

B and C (Decompensated cirrhosis) were given. MELD-Na+ score incorporates serum bilirubin, serum creatinine, International normalized ratio (INR), serum sodium level and whether patient is on dialysis or not. MELD-Na score is useful to know which patient needs liver transplantation and 90-day mortality.

Ethics:
Ethical clearance was granted by the institutional ethical committee. The guidelines issued by Indian Council of Medical Research were followed throughout the study. All the participants were explained the procedure of the study and informed consent was taken.
Statistical analysis:
Statistical analysis was done using Statistical Package for Social Sciences version 25. Data was analyzed using chi-square test for categorical variables. A p-value < 0.05 was taken as statistically significant.

4. RESULTS

The total number of patients included in the study were 54, but 7 patients were excluded due to lack of blood investigations, Hepatocellular Carcinoma, unwillingness to participate and so on. Finally, 47 patients were included for final analysis (Figure 1). Mean age of the study group is 51.6 ± 12.6 years, 24 being least age and 80 being maximum age. 89.4% are males and 10.6% are females (Table 1). 55.3% of the patients belongs to upper lower economic status, class IV, 42.6% belongs to lower economic status, class V, while only one patient belongs to higher socioeconomic class, class I. Alcohol was the most common etiology, observed in 68.1%. Hepatitis B is seen in 10.6%. One patient had both Hepatitis B and Alcoholic liver disease. One patient had Hepatitis C. Non-Alcoholic fatty liver disease (NAFLD) was observed in 8.5%. 10.6% had unknown causes (Figure 2).

61.7% of the patients had disease duration of 13 – 59 months. 25.5% of patients had longer disease duration of more than 60 months. 12.8% have disease duration 6 to 12 months (Figure 3). 46.8% of the patients had BMI of 18.1 – 22.9 (Normal). 27.7% had BMI < 18 (Underweight). 23.4% of patients BMI > 25 (Obese). One patient had BMI 23 – 24.9 (Overweight) (Figure 4)(Table 2).

14 patients were classified SGA class A, well nourished (Table 3). Of them, 10 have alcoholic liver disease, 1 had Hepatitis B, 1 had NAFLD and 2 have unknown causes. 28 patients were classified SGA class B, mild to moderate malnourished. Of them, 18 have alcoholic liver disease, 4 have Hepatitis B, 2 have NAFLD, 1 had Hepatitis C and 3 have unknown cause. 5 patients were classified SGA class C, severely malnourished. Of them, 4 have alcoholic liver disease and 1 had NAFLD. For the purpose of analysis, we

classified patients into well nourished (SGA class A) and malnourished (SGA classes B and C). 14 patients (29.8%) were well nourished. 33 patients (70.2%) were malnourished.

In detailed assessment of SGA (Table 4), number of patients having weight loss were 22 (46%) (moderate weight loss in 14 and severe weight loss in 8). Number of patients with decreased food intake were 19 (40%) (borderline intake in 18 and poor intake in 1). Number of patients with presence of gastrointestinal symptoms like loss of appetite, nausea, vomiting, diarrhea, constipation and so on. were 19 (40%). Number of patients with functional impairment were 25 (53%) (Moderate impairment in 21 and severe impairment in 4). Number of patients with loss of subcutaneous fat were 26 (55%) (Moderate loss in 21 and severe loss in 5). Muscle wasting was observed in 24 patients (51%) (Moderate wasting in 21 and severe wasting in 3). Pedal edema was observed in 37 (78%) patients (Moderate edema in 21 and severe edema in 16). Ascites was present in 41 (87%) patients (Moderate ascites in 29 and severe ascites in 12).

61.7% of patients had MELD-Na score more than 15. 38.3% of patients had MELD-Na score less than 15 (Table 5). 57.4% of the patients belonged to Child-Pugh class C, where as 31.9% belonged to Class B and 10.6 belonged to Class A (Figure 5).

Statistical analysis was done using Pearson Chi-square test. A p value of < 0.05 was taken as statistically significant. We attained statistical significance between SGA and Duration of illness (p=0.004), SGA and Child-pugh class (p=0.03), SGA and Body mass index (0.007). Although there was a clinical significance, we were unable to reach a statistical significance between SGA and MELD-Na score (p=0.67), SGA and Socio-economic status (p=0.62), SGA and Etiology (p=0.91) (Table 6).

5. DISCUSSION

In a developing country like India, the prevalence of malnourishment is high [17]. Both under-nutrition and over-nutrition influence the outcomes of a disease equally. When a patient with chronic liver disease develop malnourishment, it will add to the overall cost of care, complications, morbidity and mortality [18]. Malnourishment is the most neglected aspect of patient's care and should be incorporated into every patient's disease management algorithm.

A study done by E O Hoogendijk et al., found that malnourishment can appear in any adult regardless of their socioeconomic group [19]. Another study by AbhasneeSobhonslidsuk concluded that low socioeconomic status reduces quality of life in patients with chronic liver disease [20]. In our study, of the 33 malnourished patients, 1 was in SES class I, 17 were in SES class IV and 15 were in SES class V. We did not reach any statistical significance between SGA and socioeconomic status. This may be

due to presence of a single malnourished patient in SES class I who might have skewed the results of our study. 98% of the patients in our study belongs to lower SES classes IV & V, which is expected in a rural area like ours, can be another reason we are unable to get any statistical significance.

Body mass index is considered a standard anthropometric parameter for knowing the nutritional state of the patient. In this study, we obtained a statistical significance (p=0.007) between SGA and BMI and both SGA and BMI are associated with severity of the disease. This finding is similar to a study done by Goncalo Nunes et al., where they found malnourishment detected by BMI and SGA were equally associated with CLD severity [21]. A study done by F Baccaro et al., concluded that SGA, rather than BMI, is more useful in finding malnourishment in hospitalized patients [22]. They have considered low BMI as malnourishment, but when it comes to patients with chronic liver disease, even a high BMI should be considered as malnourishment. In our study, 63% of the obese patients were malnourished by SGA. The concept of sarcopenic obesity should be considered while calculating BMI in these patients. These patients are considered to be malnourished despite higher BMI. Dry BMI should be calculated in patients with chronic liver disease.

We tried to find association between SGA and MELD-Na score, but statistical significance (p=0.67) could not be reached. This finding is similar to a study done by Neha Bakshi et al., where they tried to find association between various nutritional assessment tools and severity indices in patients undergoing liver transplantation [23]. They concluded that none of the nutritional assessment tool, even SGA, showed significant relation with MELD-Na score. MELD-Na score is usually used to prognosticate patients if they need liver transplantation. MELD-Na score is a dynamic score which is usually high during acute states like Acute on chronic liver failure, decompensated chronic liver disease and acute liver failure itself. Some patients with chronic liver disease, who are well compensated may be well nourished. Sudden decompensation in such patients may not develop clinical malnourishment acutely. So higher MELD-Na score does not necessarily mean malnourished. Even vice-versa is true. Some malnourished CLD patients might have normal MELD-Na scores. As concluded in a study by F Gunsar et al., SGA adds up to the MELD-Na score and Child-Pugh class while assessing prognosis [10].

A study done by Ferreira et al., compared different nutrition assessment tools in patients waiting for liver transplant. They found that SGA alone had significant relationship with Child-Pugh class [15]. One more study done by ChulapornRoongpisuthipong et al., showed that Malnourishment found out by SGA correlated with clinical severity of liver disease based on Child-Pugh class [24]. A study by Neha Bhakshi et al., showed

significant relationship of SGA with Child-Pugh class. This is the same study that showed no significance with MELD-Na scores and SGA [23]. These findings are similar to our study, where we reached a statistical significance (p=0.03) between SGA and CP score but no significance between SGA and MELD-Na score.

We were unable to find any study that reported relation between SGA and duration of illness, after searching for key words subjective global assessment and duration of illness in Pubmed, Google scholar and so on. Maybe this is the first study to compare them. Duration of illness is directly proportional to the nutritional status of the patient. More the duration of chronic illness, more the patient is likely to be malnourished. Presence of cytokines such as Interleukin -1, Tumor necrosis factor-α, leads to loss of muscle mass [25]. One of the components of SGA is duration of symptoms. In this study, we attained a statistical significance (p=0.004) between SGA and duration of illness.

A study done by ChulapornRoongpisuthipong et al., concluded that nutritional disorders are more severe with alcoholic cirrhosis rather than non-alcoholic cirrhosis [24]. We did not reach any statistical significance with etiology and SGA. In our study 32 (68%) participants were alcoholics and only one (2%) had Hepatitis C. This uneven distribution might have skewed our results. 22 out of these 32 alcoholics were malnourished which is clinically significant but unable to get a statistical significance.

One study performed by Eitaro Taniguchi et al., concluded that SGA is not sufficient to identify malnourishment in CLD, but it is excellent screening tool in patients with gastrointestinal diseases [26]. One more study by Carlos Moctezuma-Valezquez et al., concluded that SGA has weak concordance with sarcopenia. Sarcopenia, not SGA, is better in predicting mortality. They want to imply Skeletal mass index is more useful than SGA in predicting mortality [27]. We would like to say that SGA should only be considered a screening tool as an easy, bedside and cost-effective method to find malnourishment. If found malnourished by SGA, further tests like free fat mass by Dual X ray absorptiometry, Bio-electric impedance analysis, computed tomography at L3/L4 vertebrae and so on should be performed to confirm malnourishment.

There are certain limitations to our study. First, our study sample is small, and COVID-19 pandemic has affected both our outpatient and inpatient departments. Second, SGA was calculated by single examiner and the result is not checked for inter-observer agreement. Third, patient distribution is not homogenous in our study (more males, more SES classes IV and V, more alcoholics and so on.). As this is a cross sectional study, large prospective studies are necessary to correctly utilize SGA.

Table 1: Demographic data of the patients

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Age	Mean: 51.6 ± 12.6
20 – 39 years	6 (12.8%)
40 – 59 years	31 (66%)
> 60 years	10 (21.3%)
Males	42 (89.4%)
Females	5 (10.6%)
Socio-Economic status	Number of patients (%)
Upper Class (I) Upper Middle Class (II) Lower Middle Class (III) Upper Lower Class (IV) Lower Class (V)	1 (2.1%) - - 26 (55.3%) 20 (42.6%)
Duration of illness	Number of patients (%)
< 12 months 13 – 59 months > 60 months	6 (12.8%) 29 (61.7%) 12 (25.5%)

Table 2: Body mass index of the patients

Body Mass Index	Number of patients (%)
< 18 (Underweight)	13 (27.7%)
18.1 – 22.9 (Normal)	22 (46.8%)
23 – 24.9 (Overweight)	1 (2.1%)
>25 (Obese)	11 (23.4%)

Table 3: Subjective global assessment of the patients.

Subjective Global Assessment	Number of patients (%)
Class A – Well nourished	14 (29.8%)
Class B – Mild/Moderately malnourished	28 (59.6%)
Class C – Severely malnourished	5 (10.6%)

Table 4: Detailed assessment of subjective global assessment

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Components of SGA	Number of patients (%)
Weight loss	Total: 22 (46%)
Moderate	14 (29%)
Severe	8 (17%)
Reduced Food intake	Total: 19 (40%)
Borderline	18 (38%)
Poor intake	1 (2.1%)
GI symptoms	Total: 19 (40%)
Functional impairment	Total: 25 (53%)
Moderate	21 (44%)
Severe	4 (8.5%)
Loss of subcutaneous fat	Total: 26 (55%)
Moderate	21 (44%)
Severe	5 (10%)
Muscle wasting	Total: 24 (51%)
Moderate	21 (44%)
Severe	3 (6.3%)
Pedal edema	Total: 37 (78%)
Moderate	21 (44%)
Severe	16 (34%)
Ascites	Total: 41 (87%)
Moderate	29 (61%)
Severe	12 (25%)

SGA: Subjective global assessment; GI: Gastrointestinal.

Table 5: Liver disease severity indices of the patients.

MELD-Na score	Number of patients (%)
< 15	18 (38.3%)
≥ 15	29 (61.7%)
Child-Pugh class	Number of patients (%)
Class A	5 (10.6%)
Class B	15(31.9%)
Class C	27 (57.4%)

MELD-Na score: Model for end stage liver disease – sodium score.

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Table 6: Correlation table

		Age	Etiology	SES	BMI	MELD-Na	CP	Duration
SGA	Pearson Correlation	.257	-.013	.004	-.470**	.061	.312*	.445**
	Sig. (2-tailed)	.081	.933	.977	.001	.683	.033	.002
*. Correlation is significant at the 0.05 level (2-tailed).								
**. Correlation is significant at the 0.01 level (2-tailed).								

SES: Socio-economic status; SGA: Subjective global assessment; BMI: Body mass index; MELD-Na: Model for end stage liver disease - sodium; CP: Child-Pugh.

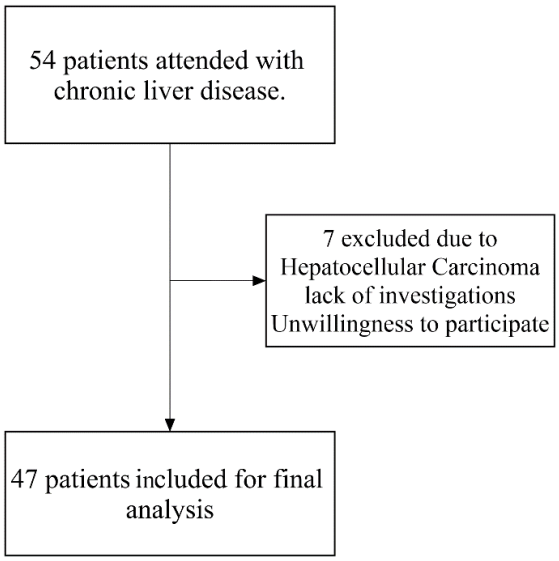
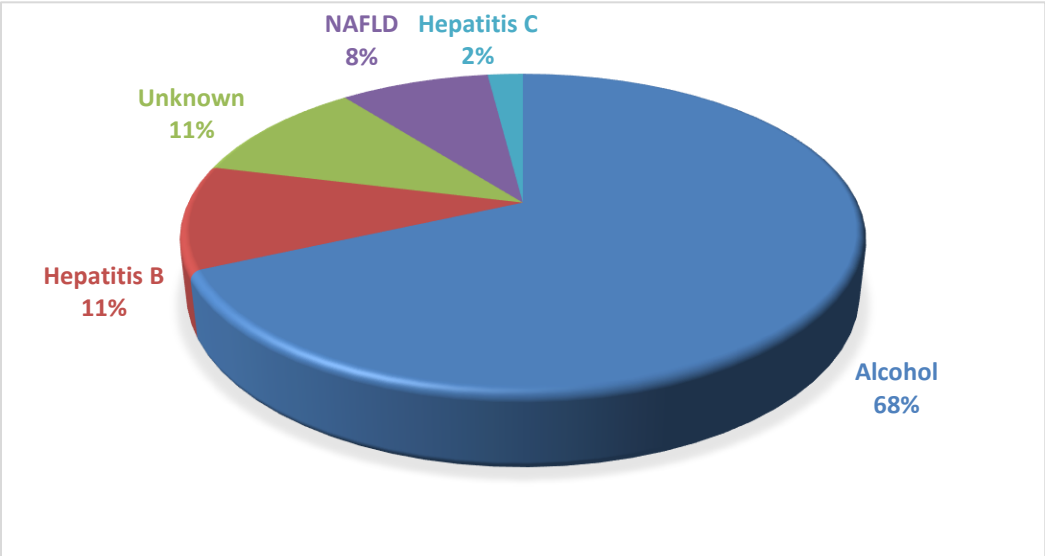


Figure 1: Patients included in the study.

Figure 2: Etiology of Chronic liver disease.



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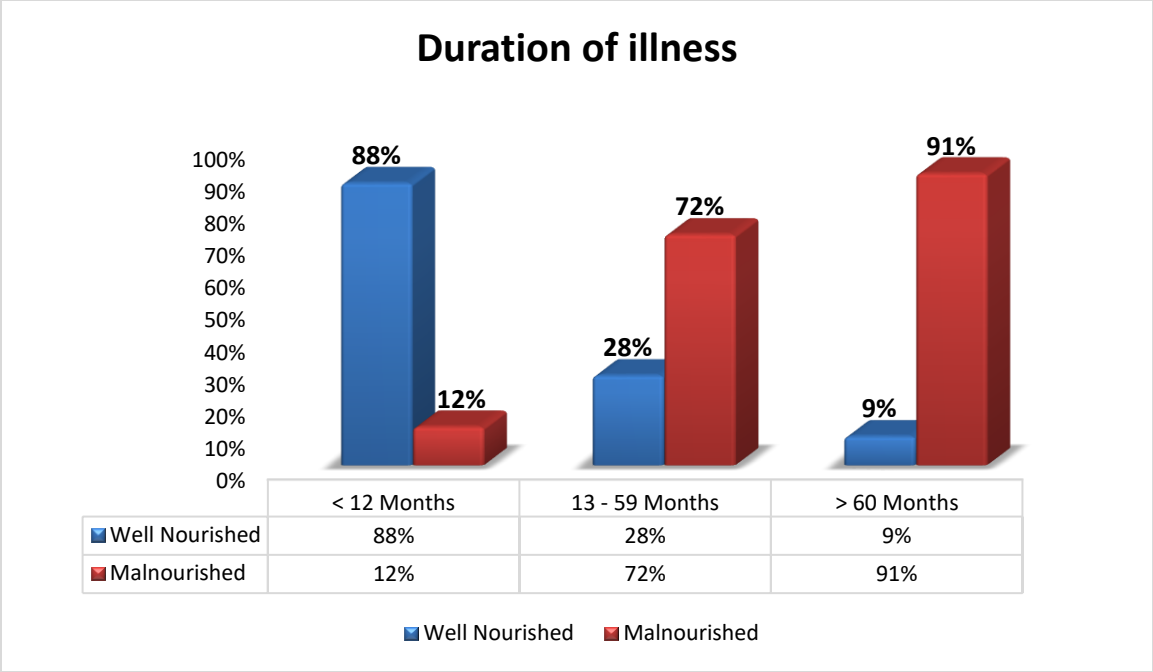

Figure 3: Association of Duration of illness with nourishment status.

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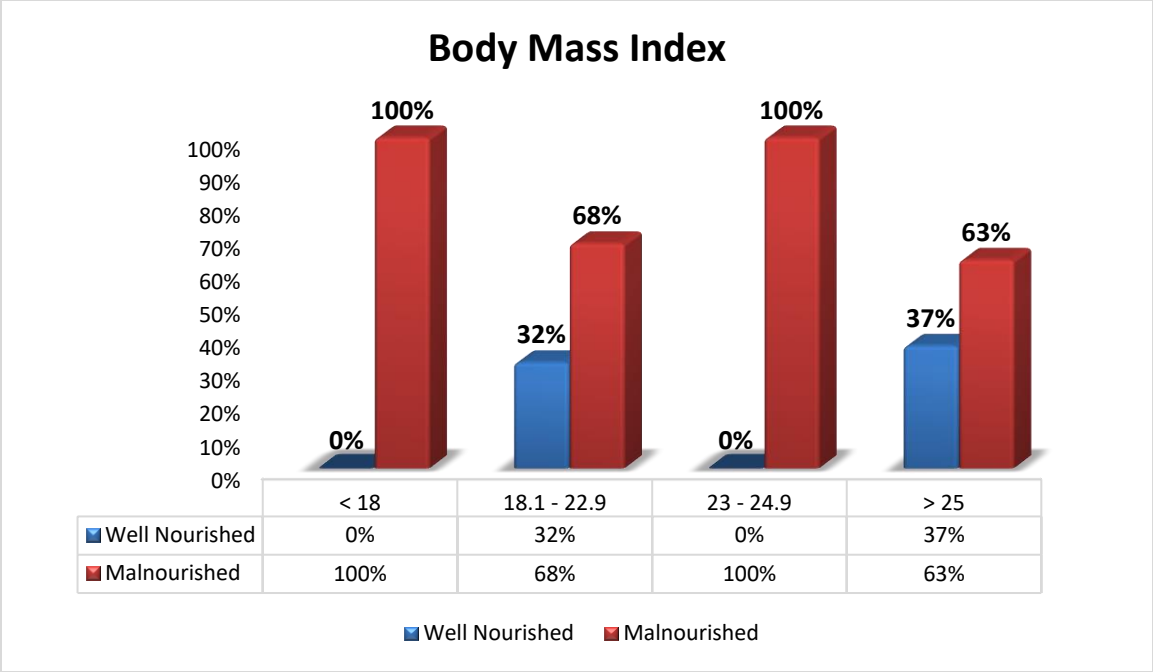

Figure 4: Association of Body mass index with nourishment status.

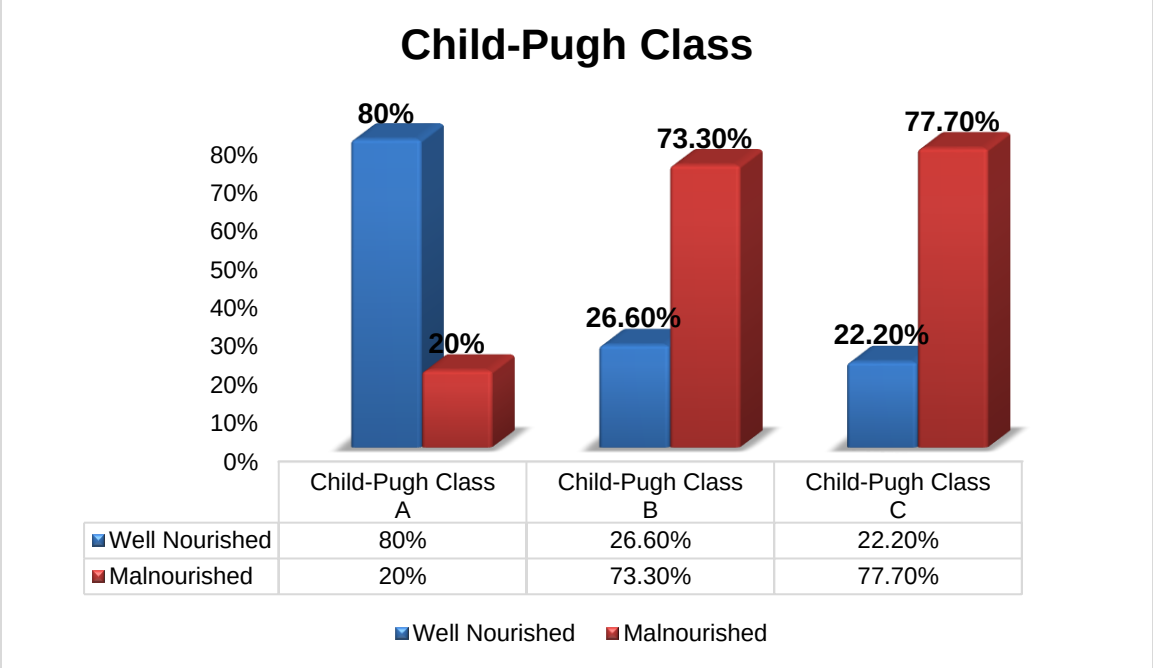

Figure 5: Association of Child-Pugh class with nourishment status.

6. CONCLUSION

As a developing country, we need a screening test for malnourishment that can be done easily and cheaply at bedside with high interobserver agreement. SGA is such a tool, and even better it categorizes patients into degree of malnourishment. SGA is well associated

with Child-Pugh class in predicting severity of the disease. SGA should be incorporated in every patient's management algorithm. Further large prospective studies are required to manage and follow up CLD patients who are malnourished or at risk of malnourishment.

CONFLICT OF INTEREST

Thereisno conflict of interest.

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