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# Subjective Global Assessment for Patients with Hepatic Cirrhosis, Egypt

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**Running head:** Subjective Global Assessment for Patients with Hepatic Cirrhosis

**Abstract:** ***Subjective global nutritional assessment (SGA) is a valid and useful clinical nutritional assessment tool for patients of various medical conditions such as renal and hepatic patients. The aim was to assess the nutritional status of patients with hepatic cirrhosis using subjective global assessment. A cross sectional study was carried out on 125 patients with hepatic cirrhosis. Data was collected for socio-demographic characteristics, determination of the degree of severity of liver disease by Child-Pugh score, laboratory investigations and nutritional assessment by using SGA score. Highest percent of patients (61.6%) with hepatic cirrhosis had mild/moderate malnutrition, and 45.6% had severe liver disease by Child-Pugh score and the highest percent of patients had anemia, low total lymphocytic count, and low albumin, high bilirubin and prolonged prothrombin time were detected in patients.***

**Keywords:** Subjective global assessment, cirrhosis, hepatic diseases

## 1. Introduction

Hepatic cirrhosis is characterized by chronic and irreversible alteration of the liver parenchyma due to modifications of both hepatic structure and functional capacity of the hepatocytes and portal circulation. Together, these alterations result in a progressive loss of liver shape and function, compromising to a varying extent the nutritional status and body homeostasis of patients affected by the disease [1]. In Egypt, chronic hepatitis C virus is the main cause of liver cirrhosis and liver cancer and, indeed, one of the top five leading causes of death [2].

Nutritional recommendations for cirrhotic patients in general focus on suppression of hepatotoxic agents and the provision of optimal macronutrient supply in terms of energy, protein, carbohydrates and lipids togetherwith micronutrients such as vitamins and minerals.In malnourished cirrhotic patients, most guidelines suggest an intake of 35–40 kcal/kg/day with a protein intake of at least 1.2–1.5 g/kg/day [3].About 60% of the calories should come from carbohydrates so that liver damage is minimized [4]. Nausea is present in all patients so fat intake should be liberal as it makes food appetizing and provides efficient energy to the body [5].

Subjective global nutritional assessment (SGA) tool is a clinical technique which assesses nutritional status based on features of the history and physical examination. It is a clinical score that allows for malnutrition diagnosis, and classification of its degree [6]. It has been shown to be a valid and useful clinical nutritional assessment tool for patients of various medical conditions such as renal and hepatic patients [7].The subjective global assessment has been considered a good approach for subjective assessment of patients with liver disease and helpful in evaluation of nutritional status in end-stage liver failure [8]. SGA classifies patients as either: well-nourished; mildly or moderately malnourished; or severely malnourished [6].The severity of cirrhosis is commonly classified with the Child-Pugh score. This scoring system uses bilirubin, albumin, prothrombin time, the presence and severity of ascites, and encephalopathy. According to the score obtained, patients can be classified as Child-Pugh class A (mild), B (moderate) and C (severe). Class A has a favorable prognosis, while class C is at high risk of death [9].

Due to unavailability of a valid tool to assess nutritional status of patients with hepatic cirrhosis, and high prevalence of hepatic cirrhosis in Egypt. The aim of the study was to use SGA for assessment of nutrition status of hepatic patients in Alexandria, Egypt and to relate its levels with the disease severity.

## 2. Subjects and Methods

**Study Design and Sampling:** A cross sectional study was carried out on 125patients who attended the Hepatogastroenterology unit in Internal Medicine Department, hospital ofMedical Research Institute andwere already diagnosed of having hepatic cirrhosis (HC) from records based oncombination of clinical features, laboratory tests and radiological imaging. All grades of severity of liver cirrhosis were eligible for the study.Patients with hepatocellular carcinomadiagnosed with other chronic diseases, such as, diabetes mellitus; renal, cardiac or pancreatic insufficiency, with acquired immunodeficiency syndrome, unconscious patients and those who were taking nutritional supplements were excluded from the study. Data about socio-demographic characteristics (age, sex and residence)was collected by interviewing patients.

**Determination of the degree of severity of liver disease by Child-Pugh score [9]**:
This score consists of five clinical measures of liver disease taken from hospital record file of each patient:(1) Presence and severity of ascites, (2) Presence and grade of hepatic encephalopathy, (3) Serum albumin level (g/dl), (4) Total serum bilirubin level (mg/dl), (5) Prothrombin time, prolongation (seconds). Each clinical measure included in Child- Pugh classification was scored from 1 to 3 points, with 3 points indicating most severe derangement.The sum of the scoring points of these five clinical parameters yields

Child-Pugh grade:Child-Pugh A (mild) = 5–6 points, Child-Pugh B (moderate) = 7–9 points and Child-Pugh C (severe) = 10 or more points.

**Subjective Global Assessment (SGA) score [6]:**The SGA score was assigned to each patient. The score includes the following:

**A. Medical History:**

- **Weight change:** Details about usual weight, current weight, the amount of weight loss and duration of weight loss ( during 6 months and 2 weeks before participating in the study )
- **Change in Dietary intake:** Changes in usual pattern of dietary intake of these patients. Patients were classified first as having normal or abnormal intake. The duration and degree of abnormal intake were also noted (starvation, hypocaloric liquids, full liquid diet, suboptimal solid diet).
- **Gastrointestinal symptoms:** Presence or absence, frequency and duration of gastrointestinal symptoms (nausea, vomiting, diarrhea, constipation and loss of appetite).
- **Functional capacity:** The extent of the change in functional capacity at past two weeks before participating in the study in form of presence or absence of difficulties in normal activities, and bed or chair ridden.

**B. Physical Examination:**

- **General examination:** Examination was performed to investigate the heart, chest, abdomen, and examination of lower limb edema and examination of ascites.
- **Subcutaneous fat loss:** Manually taken skin fold between thumb and forefinger over triceps and biceps and the space between these fingers was observed or by observation under the eye.
- **Muscle wasting:** Observation of muscles over temple, clavicle, shoulder, scapula, ribs, calf and knee.

On the basis of these features of the history and physical examination, clinicians identify he categories of SGA which indicates the patient's nutritional status. These categories are: (A) well nourished, (B) mild or moderate malnutrition, and (C) severe malnutrition. In order to getSGA categories, an explicit numerical weighting scheme is not used. Rather, a rank is assigned on the basis of subjective weighting [6].

**Records review:** All of laboratory tests had been obtained from hospital records as hemoglobin (normal level in males from 13-17 g/dl, normal level in females from 12-15 g/dl and anemic males < 13 g/dl, anemic females < 12 g/dl), total lymphocytic count (normal from1.5 - 4.0* $10^3$cells/$mm^3$and decreased < 1.5 * $10^3$cells/$mm^3$), serum albumin (normal from 3.5 - 5.0 g/dl and hypoalbuminemia< 3.5 g/dl), total serum bilirubin (normalup to 1.0 mg/dl and increased > 1.0 mg/dl**)** and prothrombin time (normal 11.1second and prolonged > 11.1second) [10].

**Statistical Analysis:** The statistical package for social science (SPSS) version "23" software (Chicago, Illinois, US) was used. For all analyses P value < 0.05 was used to detect statistically significant difference. Data were analyzed using Chi squared test for categorical variables.Monte Carlo technique was used if more than 25% of cells had expected count less than 5.

**Ethical considerations:** Approval of Ethics Committee of High Institute of Public Health was obtained. All patients were informed and their written consent was taken from every one after explaining the aim of the study. Confidentiality of the collected data of participants was considered. No private questions were included. No obligation of any kind for participating in the study, and every participant was free to withdraw from completing the study at any time.

## 3. Results

A total of 125 patients participated in this study. The mean age of patients was 56.88± 7.84 years, 57.6% were males and 42.4% were females. The highest percent of patients (72%) were from rural areasas shown in Table 1.

Regarding medical history of patients, the highest percent of them (64.4%) experienced moderate weight loss in the past six months. The most common symptoms affecting oral intake of patients was constipation (76%) followed by nausea (73.6%) then feel full quickly (61.6%). Almost sixty percent (60.8%) of patients had reduced functional capacity.As regard physical examination of patients included in subjective global assessment score as shown in table 2, 68% of patients had mild/moderate fat loss, almost half of them (52%) had mild muscle loss, 76.8% had no edema and 48% of patients had mild/moderate ascites as presented in table 2

Table 3 shows that 61.6% of patients had score B indicating mild to moderate malnutrition, 22.4% of patients had score A indicating well-nutrition and only 16% of patients had score C indicating severe malnutrition. Among males, 65.3% scored B indicating mild to moderate malnutrition, 19.4% scored A indicating well-nutrition and only 15.3% scored C indicating severe malnutrition. Among females, 56.6% scored B indicating mild to moderate malnutrition, 26.4% scored A indicating well-nutrition and only 17% scored C indicating severe malnutrition.

Table 4 shows that 61.7% of anemic patients were mildly/moderately malnourished(SGA score B) and only 16.5% of anemic patients were severely malnourished (SGA score C). Regarding patients with decreased total lymphocytic count, about two-third (66.7%) of them were mildly/moderately malnourished (SGA score B) and only 17.3% of them were severely malnourished (SGA score C).

Also table 4 shows, there is a significant association between SGA score and albumin level where 64.2% of patient with hpoalbuminemia were mildly/moderately malnourished (SGA score B), 18.3% were severely malnourished (SGA score C). Regarding patients with increased total serum bilirubin level, more than half (60.9%) of them were mildly/moderately malnourished (SGA score B), 21.7% were severely malnourished (SGA score C). The difference was statistically significant (P = 0.004).More than half (62.5%) of patients withprolonged prothrombin time was

mildly/moderately malnourished (SGA score B) and only 16.7% were severely malnourished (SGA score C).

As shown in table 5, 45.6% of the patients were Child-Pugh grade C indicating severe liver disease followed by 40.8% of patients were Child-Pugh grade B indicating moderate liver disease and only 13.6% of patients were Child-Pugh grade A indicating mild liver disease. The highest percent (52.8%) of males were Child-Pugh grade C indicating severe liver disease, while the highest percent (50.9%) of females were Child-Pugh grade B indicating moderate liver disease.

As shown in figure (1),more than half (58.8%) of patients with Child-Pugh grade A(mild liver disease) were well-nourished (SGA score A). 60.8% of patients with Child-Pugh grade B (moderate liver disease) were mildly/moderately malnourished (SGA score B). Most of patients (68.4%) with Child-Pugh grade C (severe liver disease) were mildly/moderately malnourished (SGA score B), and 29.8%of these patients were severely malnourished (SGA score C). The difference was statistically significant (P = 0.000).

## 4. Discussion

In Egypt, the problem of malnutrition in patients with hepatic cirrhosis (HC) is neglected despite of its crucial impotent in prognosis and follow up of such patients [11].Malnutrition in HC has been related to worse clinical outcomes and higher incidence of complications such as ascites, hepatic encephalopathy and infections, hepatorenal syndrome and diabetes mellitus.It is considered a risk factor for morbidity and mortality in short and long term before and after liver transplantation as well as in abdominal surgery [12,13].

In the present study,72% of patients were from rural areas. This agree with study by Rao et al.who reported that; in Egypt, liver cirrhosis was more common in rural than urban regions because rural regions presented a suitable environment for developing a schistosomal infection due to exposure to canal water that may be polluted by snails that harbor the schistosomal parasite [14]. Likewise, Abd el Ghaffar added that in Egypt, liver cirrhosis with or without chronic active hepatitis constituted about 50% of all chronic liver diseases that met within Egypt and even higher percentage in rural Egypt [15].

In the present study, the highest percent of patients had moderate weight loss. This weight loss may be due to that high percent of patients had constipation, nausea, loss of appetite and feel full quickly leading to no change or worsening in oral intake. These results were in accordance with results reported by Detsky et al [6]. The diagnosis of malnutrition by SGA is associated with the reduction of body weight; with gastrointestinal alterations, such as, diarrhea, anorexia, nausea and vomiting; with a reduction in the consistency and in the quantity of food intake and with a reduction in functional capacity [16]. In SGA, weight loss has direct relationship with malnutrition [6]. The presence of depletion of the adipose tissue, of muscular mass and hydric retention, such as, ascites and swelling of the ankles was verified by the physical examination by SGA [6]. However, some parameters as weight change, functional capacity and presence of ascites and edema may be because of chronic liver failure and its treatment and may not be related to malnutrition [16].

The reduced functional capacity that represents in difficulty in ambulation or normal activities and present in 60.8% of patients may be due to the presence of voluminous ascites and/or from the spoliation of micronutrients due to the frequent and chronic use of diuretics [16]. On the other hand, edema may be due to the reduction of albumin synthesis associated with chronic hepatic insufficiency [16].

In the present study, by using SGA method, the highest percent of patients were diagnosed as malnourished (mildly, moderately or severely malnourished). This agrees with other studies which stated that PEM occurs in at least 50% and up to 90% of patients with liver cirrhosis and progresses as liver function deteriorates [17]. Likewise, other studies stated that malnutrition is present in 65% to 100% of patients with chronic hepatic diseases [18,19]. PEM is prevalent in all forms of liver diseases; from 20% in compensated liver cirrhosis to more than 80% in those patients with decompensate disease [18,20]. In the current study, severe malnutrition prevalence (16%) was lower than prevalence reported by Fatima et al where the prevalence of severe malnutrition reached to 31.6% according to SGA [21]. This may be due to the nutritional advice given to patients in hospitals.

The use of biochemical tests for nutritional assessment in individuals with liver disease is questioned, because it may represent liver dysfunction and does not necessarily represent changes in nutritional status [22,23]. Low hemoglobin level was found in the majority of HC patients. This finding is matched with Mc-Hutchison et al who stated that anemia of diverse etiology occurs in about 75% of patients with chronic liver disease [24]. Hematological abnormalities and decrease intake of food stuff that contain iron are main causes. Furthermore a major cause of anemia associated with chronic liver disease is hemorrhage, especially into the gastrointestinal tract [25]. Furthermore, in severe hepatocellular disease, decreased synthesis of liver-produced plasma proteins leads to reduced serum levels of several blood clotting factors. Hemorrhage may occur as a complication of chronic liver disease because of a lack of one or more liver-produced blood clotting factors, thrombocytopenia, and/or defective platelet function [26].

In the current study, there was not a statistical significant relationship between SGA score and Hb level. Although hemoglobin is independent of hepatic metabolism, it may be altered in patients with severe portal hypertension and hypersplenism as well as in the presence of gastrointestinal hemorrhages [24].It is noteworthy that laboratory parameters are affected by liver disease severity as well as by the etiological factors of the disease [22,23]. Hence, they are more strongly correlated with disease severity than with malnutrition per se. Further studies are needed to explore the correlation between hemoglobin and the nutritional status of the liver disease patients and the possible causes regardless the liver condition.

Low lymphocyte count that present in study patients probably due to presence of infection, electrolyte imbalance, renal failure, metabolic stress, inflammatory bowel diseases or immunosuppression, conditions observed in patients with liver failure and thus impairing its use as a nutritional indicator [27]. Low level of albumin in these patients should be taken cautiously as this may confound the relation between liver affection and nutritional status of those patients, because the reduction of serum albumin levels in HC patients, principally among those with moderate or severe hepatic insufficiency, could be associated with either malnutrition, due to reduction in food intake and to the worsening metabolism of nutrients, or with the hepatic dysfunction itself which compromises albumin synthesis [28].

There is a significant increase in bilirubin level in such patients with the deterioration of nutritional status which was matched with the result reported by Mei-Ling et al, who find that more increase in bilirubin levels with more decline in nutritional and functional performance of the liver [29]. This finding is very important when we proceed in management of increased bilirubin levels in hepatic patients (Jaundice) as the role of nutritional support in management of such problem is usually neglected by all health care physicians [30]. The biosynthetic pathways of blood coagulation factors II, VII, IX and X are within the hepatocyte .Low serum levels of these factors are associated with prolongation of the prothrombin time (PT) which was in accordance with current study [26]. In the present study, the SGA score of nutritional status had been used to assess malnutrition in different stages of HC where there is a significant increase in number of patients who had a deteriorated nutritional status (mild, moderate and severe malnutrition) with the increase in the severity of liver disease as classified by Child-Pugh score (A, B and C). This result agreed with Mei-Ling et al, who revealed that patients with compensated cirrhosis had a higher proportion of bad nutritional status (SGA grade C) in Child-Pugh C cirrhotic compared to Child-Pugh B cirrhotic patients [31]. Also, Roongpisunthinpong et al. reported that SGA correlates with liver disease severity, thus indicating the usefulness of SGA in patients with chronic liver disease [32].

## 5. Conclusion

The majority of HC patients were from rural areas.The highest percent of patients with hepatic cirrhosis had mild/moderate malnutrition.More than two-third of patients had severe liver disease.There is a significant correlation between the severity of liver disease and the degree of malnutrition in patients with hepatic cirrhosis.The highest percent of patients had low hemoglobin, total lymphocytic count and albumin and high bilirubin and prolonged prothrombin time

## 6. Recommendations

Regular assessment of dietary intake pattern and weight changes of patients with hepatic cirrhosis is recommended. Nutritional advice should be given to patients with hepatic cirrhosis by nutrition specialist and special dietary pamphlets should be prepared for each patient describing the healthier foods they should consume.Nutrition intervention programs should be directed to rural areas.National centers or institutions specialized in liver diseases should be established and supported, in every governorate if possible. Such centers will not only provide treatment but would also be essential for research and training of medical staff to deal with nutritional care for such patients.

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## 8. Conflicts of interest

The authors declare no conflict of interest.

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**Table 1:** Distribution of patients according to socio-demographic data

| Socio-demographic data | | Male | | Female | | Total | | Test of significance |
|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | |
| Age in years: | | | | | | | | |
| | 40-49 | 10 | 13.9 | 10 | 18.9 | 20 | 16.0 | $X^2$=2.6 P=0.273 |
| | 50-59 | 39 | 54.2 | 21 | 39.6 | 60 | 48.0 | |
| | ≥60 | 23 | 31.9 | 22 | 41.5 | 45 | 36.0 | |
| | Mean ± SD | | 56.88 | ± 7.84 | | | | |
| Residence: | | | | | | | | |
| | Rural | 54 | 75.0 | 36 | 67.9 | 90 | 72.0 | $X^2$=0.75 P=0.384 |
| | Urban | 18 | 25.0 | 17 | 32.1 | 35 | 28.0 | |
| | Total | 72 | 100 | 53 | 100 | 125 | 100 | |

P > 0.05 indicates non -significant difference

**Table 2:** Subjective Global Assessment (SGA) score of patientsincluding both medical history and physical examination

| **Subjective Global Assessment (SGA) score** | **Total** | |
|---|---|---|
| | **No.** | **%** |
| **A- Medical history of patients:** | | |
| **1. Subjective loss of weight during the past six months:** | | |
| None or mild | 23 | 18.4 |
| Moderate | 81 | 64.8 |
| Severe | 21 | 16.8 |
| **2. Symptoms affecting oral intake** | | |
| None | 3 | 2.4 |
| Pain on eating | 7 | 5.6 |

| | | |
|---|---|---|
| Loss of appetite | 54 | 43.2 |
| Vomiting | 20 | 16.0 |
| Nausea | 92 | 73.6 |
| Dental problems | 22 | 17.6 |
| Diarrhea | 3 | 2.4 |
| Constipation | 95 | 76.0 |
| Feels full quickly | 77 | 61.6 |
| Difficulty in swallowing | 6 | 4.8 |
| **3. The extent of the change in functional capacity during the past 6 months:** | | |
| No dysfunction | 49 | 39.2 |
| Reduced capacity | 76 | 60.8 |
| **4. Changes in usual pattern of dietary intake** | | |
| No change; adequate | 30 | 24 |
| Inadequate | 95 | 76 |
| **B- Physical examination of patients:** | | |
| **1. Loss of body fat:** | | |
| No | 17 | 13.6 |
| Mild/Moderate | 85 | 68 |
| Severe | 23 | 18.4 |
| **2. Loss of muscle mass:** | | |
| No | 51 | 40.8 |
| Mild/Moderate | 65 | 52 |
| Severe | 9 | 7.2 |
| **3. Presence of edema:** | | |
| No | 96 | 76.8 |
| Mild/Moderate | 29 | 23.2 |
| **4. Presence of ascites:** | | |
| No | 35 | 28 |
| Mild/Moderate | 60 | 48 |
| Severe | 30 | 24 |

**Table 3:** Subjective Global Assessment (SGA) classification of patients

| Subjective Global Assessment (SGA) classification | | Male | | Female | | Total | | Test of significance |
|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | |
| | Well-nourished (Score A) | 14 | 19.4 | 14 | 26.4 | 28 | 22.4 | $X^2$=1.1 P=0.580 |
| | Mildly/moderately malnourished(Score B) | 47 | 65.3 | 30 | 56.6 | 77 | 61.6 | |
| | Severely malnourished(Score C) | 11 | 15.3 | 9 | 17.0 | 20 | 16.0 | |
| | **Total** | 72 | 100 | 53 | 100 | 125 | 100 | |

P > 0.05 indicates non -significant difference

**Table 4:** Distribution of patients according to laboratory tests and Subjective Global Assessment (SGA) rating

| Laboratory test | SGA rating | | | | | | Test of significance |
|---|---|---|---|---|---|---|---|
| | Well-nourished (Score A) (n=28) | | Mildly/ moderately malnourished (Score B) (n=77) | | Severely malnourished (Score C) (n=20) | | |
| | No. | % | No. | % | No. | % | |
| **Hemoglobin level (Hb) (g/dl):** Anemia | 25 | 21.7 | 71 | 61.7 | 19 | 16.5 | MCP =0.802 |
| Normal | 3 | 30 | 6 | 60 | 1 | 10 | |
| **Total lymphocytic count (TLC) (cells/mm3):** Decreased | 12 | 16.0 | 50 | 66.7 | 13 | 17.3 | $X^2$=4.418 P=0.11 |
| Normal | 16 | 32 | 27 | 54 | 7 | 14 | |
| **Serum albumin level (g/dl):** Hypoalbuminemia | 19 | 17.4 | 70 | 64.2 | 20 | 18.3 | MCP =0.002* |
| Normal | 9 | 56.2 | 7 | 43.8 | 0 | 0 | |
| **Total serum bilirubin (TSB) level (mg/dl):** Increased | 16 | 17.4 | 56 | 60.9 | 20 | 21.7 | $X^2$=11.17 P=0.004* |
| Normal | 12 | 36.4 | 21 | 63.9 | 0 | 0 | |
| **Prothrombin time (PT) (prolonged in seconds):** Prolonged | 25 | 20.8 | 75 | 62.5 | 20 | 16.7 | MCP =0.102 |
| Normal | 3 | 60 | 2 | 40 | 0 | 0 | |

P ≤ 0.05 indicates significant difference.

**Table 5:** Classification of patients according to severity of liver disease by Child-Pugh grades

| Child-Pugh grade | | Male (n=72) | | Female (n=53) | | Total (n=125) | | Test of significance |
|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | |
| | A (mild liver disease) | 10 | 13.9 | 7 | 13.2 | 17 | 13.6 | $X^2$=4.3 P=0.119 |
| | B (moderate liver disease) | 24 | 33.3 | 27 | 50.9 | 51 | 40.8 | |
| | C (severe liver disease) | 38 | 52.8 | 19 | 35.8 | 57 | 45.6 | |

P > 0.05 indicates non -significant difference

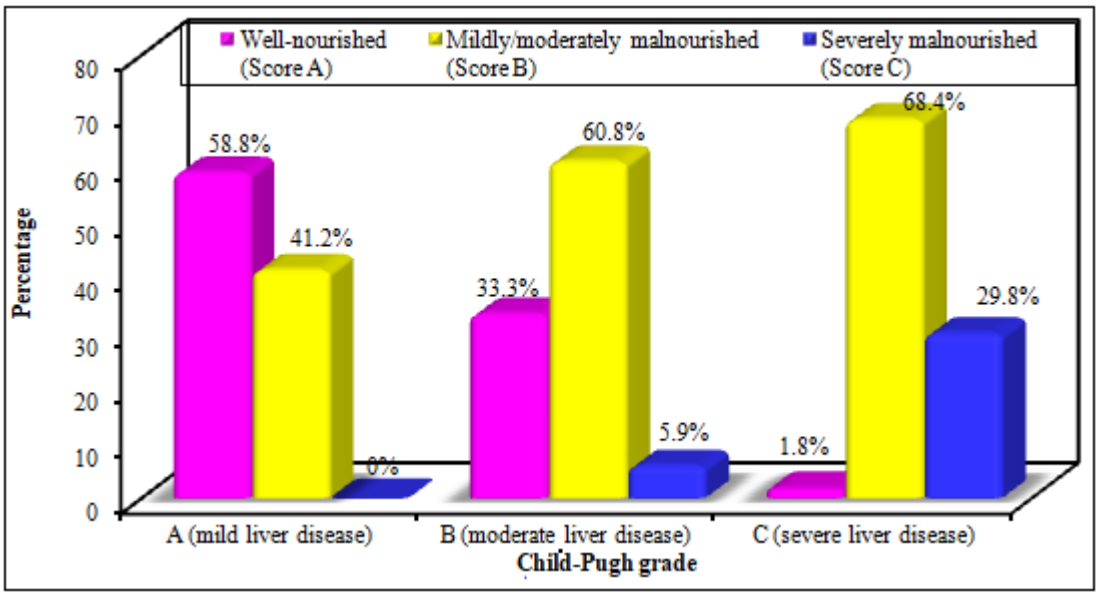


**Figure 1:** Relation between Child-Pugh grade and Subjective Global Assessment (SGA) rating