Prevalence of Malnutrition among Cancer Patients in a Nigerian Institution

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Abstract: *Background*: Cancer is a major health problem. Successful management includes adequate supportive care. Nutritional problems are common among cancer patients and these are not routinely addressed by oncologists during oncology care leading to suboptimal outcome even in developed countries. In Nigeria and other low and medium income countries, the situation is worse as nutritional screening and assessment of cancer patients are not routinely carried out.

Objectives: To determine the proportion of cancer patients at risk of malnutrition and compare convergence of risk assessment using SGA and MUST tools.

Methods: This was a prospective study carried out among cancer patients who presented for cancer care in the Department of Radiation Oncology, University College Hospital Ibadan, Nigeria. Nutritional assessment tools which included Malnutrition Universal Scoring Tool (MUST) and Subjective Global Assessment (SGA) were used to assess the nutritional status of the participants.

Results: A total of 89 patients aged between 18 and 85 years participated in the study. The number of males were 13 (15%) while females were 76(85%). In our study 54 (60.8%) of our patients were at risk of malnutrition using the malnutrition universal scoring tool (MUST) scale while 53(60%) were malnourished using the subjective global assessment (SGA) scale. The reliability for the classifications using the MUST and SGA scales was positive (moderate) [Kappa = 0.584 ($p<0.0005$), 95% CI (0.410, 0.758)].

Conclusion: There is a high proportion of clinical malnutrition among cancer patients in the study population. According to this study, there was similarity between the classifications of nutritional risk, using the MUST and SGA tools.

Keywords: Nutrition, Status, oncology, MUST, SGA, nutritional assessment.

BACKGROUND OF THE STUDY

Cancer is a major cause of morbidity and mortality throughout the world. It is the second most frequent cause of death in developed countries like the countries of Europe and is becoming a significant cause of death in low and medium income countries like Nigeria [1]. Patients with cancer usually develop various physical symptoms. Malnutrition and weight loss are common and are due to a variety of mechanisms associated with either the tumour, the host response to the tumour or anti-cancer therapies. Malnutrition can be defined as an abnormal body composition with functional impairment of different organs, due to an acute or chronic imbalance between energy and protein availability and other body requirements. This imbalance may be as a result of i) a reduced intake of nutrients (secondary to poor administration of food, anorexia, dysphagia, or vomiting), ii) an excessive loss of nutrients from the gut (secondary to malabsorption or fistulae.), iii) an alteration of the metabolic utilization of the substrates or iv) different combinations of these factors [2].

Inadequate intake of nutrients alone may not account for the substantial changes in nutritional status seen in patients with cancer. In advanced cancer, cachexia often occurs. This complex multifactorial syndrome is associated with metabolic abnormalities, anorexia, early satiety and reduced food intake, depletion of lean body mass, muscle weakness, oedema, fatigue, impaired immune function and declines in attention span and concentration [3]. Proactive nutritional interventions should ideally form an integral part of cancer therapy with the aim of enhancing clinical outcome and quality of life (QoL).

Close to 85% of all cancer patients develop clinical malnutrition which negatively affects patients' response to therapy, increases the incidence of treatment-related side effects and can decrease survival [4]. These patients need nutritional counselling, but only about 17% receive such even in some developed countries [5]. The proportion will be far less in developing countries like Nigeria. Early identification of patients who are malnourished or are at risk of malnutrition can promote recovery and improved outcome of treatment.

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Also, early nutritional intervention is cost effective as it reduces complication rates and hospital stay. The development and use of appropriate screening and assessment tools are essential for effective nutritional intervention and management of patients with cancer. The nutritional screening aims to identify patients who are malnourished or at significant risk of malnutrition [6] (Davies M, 2005). The patients identified through nutritional screening require referral to a dietician or nutrition specialist for an in-depth nutritional assessment. The nutritional assessment involves medical, dietary, psychological and social history, physical examination, anthropometry and biochemical testing. Then based on the outcome of the assessment, nutritional interventions may be initiated and should be tailored to the individual, considering patient's prognosis.

Causes of Malnutrition

Many cancer patients are already malnourished at the point of presentation, while others become malnourished during their hospital care. The factors responsible may include alterations in the nutrient intake, digestion, absorption, and metabolism of food. General risks for malnutrition include gastrointestinal (GI) disorders, malignancies, chronic disease, lower socioeconomic status, older age, psychological disorders, alcohol and drug abuse, and lower levels of education [7]. Patients with GI disorders, especially patients with oral cancer are the most prone to developing malnutrition, because of reduced intake. Patients with gastroparesis, gastric outlet or bowel obstruction, and motility disorders present with varied degrees of malnutrition depending on how long they have waited to seek medical care. Gastro intestinal (GI) cancers or surgical resections of the GI tract for cancer or Crohn's disease can result in severe mal-digestion and malabsorption of nutrients, likewise chronic digestive disorders such as cystic fibrosis. Gastric bypass procedures, while effective for weight loss, predispose patients to serious micronutrient deficiencies. Hepatocellular carcinoma can contribute to poor nutrient digestion and absorption, and patients with pancreatic cancer often present with malnutrition [8].

Symptoms of Malnutrition

Malnutrition can often be very difficult to recognise, particularly in patients who are overweight or obese. Malnutrition can happen very gradually, which can make it tough to spot in the early stages. Some of the symptoms and signs to watch out for include loss of appetite, weight loss (clothes, rings, jewellery, dentures may become loose), tiredness, loss of energy and reduced ability to perform normal tasks. Others include reduced physical performance (for example, not being able to walk as far or as fast as usual) altered mood (malnutrition can be associated with lethargy and depression) and poor concentration [9]. Nutritional care is an important aspect of oncology practice, and nutritional assessment plays an essential role in the early detection and screening for malnutrition in patients with cancer. Most cancer treatment modalities such as surgery, chemotherapy and radiotherapy and their associated side effects can increase patients' risk of malnutrition during treatment leading to severe deterioration of health status with the consequent increase in complications, decrease tolerance to therapy and poor quality of life. Nutritional intervention has enabled more than 60% of cancer patients to complete their treatment without weight loss [10]. For patients with cancer who are at nutritional risk to be appropriately identified and referred for specialist nutritional care, nutrition screening should be routinely used in oncology settings [11].

Studies on nutrition among cancer patients in Nigeria are scarce and clinical practice of nutritional management of cancer patients is often overlooked. The results of this study will provide baseline data that will be useful in improving the clinical nutritional management of cancer patients towards ensuring better oncology treatment outcome.

Aim

The aim of this study was to assess the nutritional status of cancer patients at the University College Hospital Ibadan to identify those that will need nutritional intervention

Objectives

The following were the objectives of the study

1. To determine the prevalence of malnutrition among cancer patients seen at The University College Hospital Ibadan, Nigeria
2. To identify the proportion of cancer patients at risk of malnutrition using the SGA scale in the study population
3. To identify the proportion of cancer patients who are at risk of malnutrition using the MUST scale in the study population.

4. To compare the diagnosis of nutritional risk obtained through two different methods (MUST and SGA) in patients with cancer

METHODS

This prospective cross-sectional study was carried out among cancer patients who presented for cancer care in the Department of Radiation Oncology, University College Hospital Ibadan Nigeria. Ethical approval was obtained from the Institutional Ethics Committee, and consent was obtained from all participants. Patients included in the study were the ones with histological confirmation of their diagnosis, had ECOG performance status of at least 2 and aged above 18 years while those excluded from participation included patients with co-morbidities like HIV/AIDS, tuberculosis infection, uncontrolled diabetes mellitus and mental disorder. Others were patients who could not stand upright for proper height and weight measurements and those with lymphedema. Sociodemographic information were obtained from the patients while disease characteristics were obtained from patients' hospital records. Anthropometric measurements were done to determine body mass index (BMI). Information was obtained for assessment using tools with clinical and biological scores namely The Malnutrition Universal Scoring Tool (MUST) and Subjective Global Assessment (SGA). The MUST tool was developed to detect protein-calorie malnutrition and the risk of malnutrition development, using standards based on previous reports [12]. This method has among its four parameters of nutritional risk identification, the percentage weight loss in the last six months, the BMI (cut-off point 18.5 kg/m^2) and also assesses the possible acute effect of the disease's through observing if the patient has been eating or not in the last five days [13]. These parameters are scored on a 3 point scale of 0-2. The score on each parameter are then added together to get a final score which is then used to classify the overall risk of malnutrition as follows : Score 0- Low Risk ,Score 1 -Medium Risk and Score 2 or more as High Risk.

The Subjective Global Assessment (SGA) tool created by Detsky and colleagues (1987), is a more comprehensive tool comprising of observation focusing on weight loss, gastrointestinal symptoms like nausea and vomiting, and physical examination focusing on loss of subcutaneous fat tissues and muscle wasting [14]. Its purpose then was to identify nutritionally-at-risk patients before surgery. The SGA not only reliably classifies nutritional status but also predicts survival and it has been reported that patients classified as being of normal nutrition using SGA had significantly better survival compared with patients classified as moderate malnutrition and severe malnutrition, independent of age and stage of cancer [15]. Currently, the SGA is used as a general nutritional screening/diagnostic tool as it is adequate to identify cancer patients with nutritional risk/ malnutrition and who would benefit from a nutritional intervention aimed at preventing associated complications [16,17]. These two tools have been widely used among cancer patients and have been previously used to assess the nutritional status of people living with HIV/AIDS in Nigeria [18]. However, MUST is more sensitive for screening and is simpler to be employed in a busy clinic to screen those who will need further assessment and management. It can also detect overweight and is user friendly as it has been used by a wide range of health personnel. It cannot however identify which area of intervention is needed by a patient such as if symptom control is needed or if metabolic demand conditions are present in a patient.

SGA is suitable for both screening and assessment and provides a more detailed assessment for planning intervention. The scale scores patients on a three point scale on weight change in the last 6 months, dietary change, change in dietary intake, gastrointestinal symptoms, functional capacity impairment, added metabolic demands from comorbidities, physical changes like loss of subcutaneous fat and fluid retention. At the end the scores are added together and used to rate patients as well nourished, moderately malnourished or severely malnourished. Due to the more detailed nature of the tool, it is not widely used in routine screening and is therefore used for intervention purposes.

The measurements and assessments for this study were done by a same well-trained appraiser.

The classification of nutritional status of each participant was done as follows

1. BMI-based classification [Wt (kg)/H^2 (m)]. This reflects calorie intake of the patient as follows [19].

<20	Underweight
20-25	Optimal
26-30	Overweight
31-40	Obese
>40	Morbidly obese

2. Classification based on nutrition assessment tool MUST [17,20].

   A. No risk

   B. Moderate risk

   C. High risk

3. Classification based on nutrition assessment tool SGA [21].

   A. No risk/ malnutrition

   B. Moderate risk/ malnutrition

   C. Severe risk/ malnutrition

The classification based on nutrition assessment tools was used to classify participants generally as having no risk of malnutrition or risk of malnutrition (moderate risk of malnutrition plus the severe risk of malnutrition).

A convergence analysis using Kappa statistic was performed to determine convergence between classifications using MUST and SGA tools. Microsoft Office Excel® 2013 and SPSS: 20 were the programs used to analyse the data.

RESULTS

A total of 89 participants had complete data for all analyses out of the 107 cancer patients that were recruited into the study giving a response rate of 83%. Their ages were between 18 and 85 years (Mean 51.05 ± 14.02 years). The age distribution of respondents are

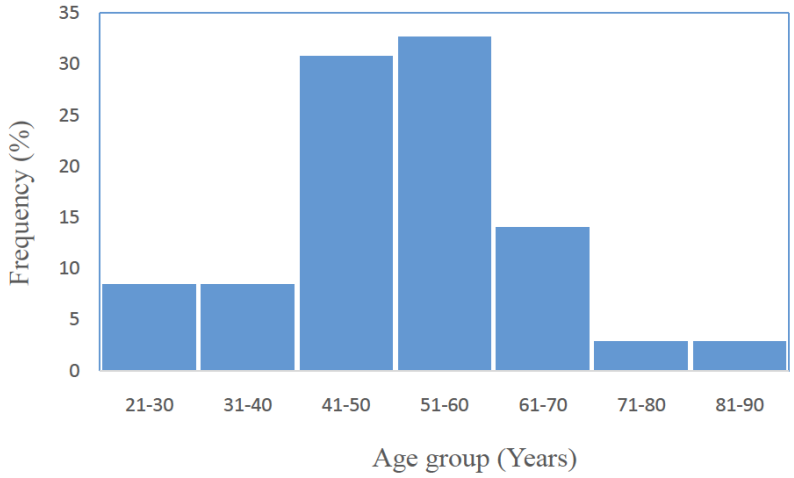

Figure 1: Age distribution of cancer patients screened for malnutrition (N =89).

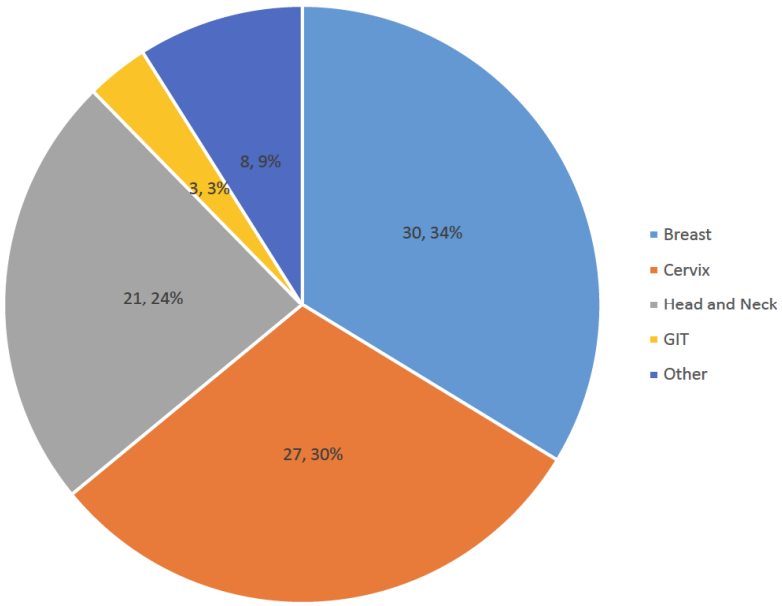

Figure 2: Distribution of sites of disease in 89 cancer patients screened for malnutrition.

presented in Figure **1**. The number of males were 13 (15%) while females were 76(85%).

The most common site of disease among the participants was breast cancer (Figure **2**). Other sites 8 (9%) included bladder, lung (non-small cell lung cancer and mesothelioma) and some were soft tissue sarcomas and lymphomas at various sites. Patients with advanced disease were 56 (63%) while 33 (37%) presented with early disease. Other clinical characteristics of the patients are presented in Table **1**.

Table 1: Clinical Characteristics of Cancer Patients Screened for Malnutrition (N=89)

Variables	Frequency (N)	Percentage (%)
Disease stage		
I	4	4
II	29	33
III	35	39
IV	21	24
Treatment Classification		
Primary	66	73.8
Recurrent	19	21.7
Persistent Disease	2	1.9
Palliative	2	2.8

The nutritional evaluation of cancer patients for malnutrition based on the body mass index (BMI), MUST and SGA scores are presented in Table **2**. From the table, based on BMI, the majority (52.9%) were either overweight or obese, while 35.9% were normal and 11.2% were underweight. Based on the MUST, 31.5% had a moderate risk of malnutrition, and 29.2% were at severe risk of malnutrition. According to the SGA, 55.1% were moderately malnourished, 4.7% were at severely malnourished while 40.2% were classified not malnourished.

Kappa (κ) test was run to determine if there was an agreement between two nutritional assessment tools on whether 89 cancer patients were at risk of malnutrition. There was a moderate agreement between the two assessment tools (MUST and SGA) and the result is presented in Table **3**.

Table 2: Nutritional Evaluation of Cancer Patients for Malnutrition Based on BMI, MUST and SGA Scores (N=89)

Variables	Frequency (N)	Percentage (%)
BMI		
Underweight	10	11.2
Normal	32	35.9
Overweight	26	29.3
Obese	20	22.5
Morbidly obese	1	1.1
MUST classification		
No Risk	35	39.3
Moderate Risk	28	31.58
Severe Risk	26	29.20
SGA classification		
Not Malnourished	36	40.2
Moderately Malnourished	49	55.1
Severely Malnourished	4	4.7

The nutritional risks based on cancer sites are presented in Table **4**. Breast cancer patients formed the highest number of patients with 16(53%) and 13 (44%) having a risk of malnutrition using MUST and SGA scales respectively. Patients with GIT tumours were only 3 with 2 (67%) and 3 (100%) at risk of malnutrition on using MUST and SGA tools respectively.

DISCUSSION

Malnutrition is prevalent among cancer patients and may be correlated with poor response to therapy and low quality of life. Cancer patients experience metabolic alterations, which render them to have protein-energy malnutrition throughout all stages of the

Table 3: Convergent Validation Tests on the Result Achieved by the MUST and SGA Protocols in Patients with Cancer at University College Hospital Ibadan Nigeria (κ = .593 (95% CI: 0.410 to 0.758, *p* < .0005)

	SGA		Total
	No Nutritional Risk	Nutritional Risk	
Must No Nutritional Risk	23	11	34
Nutritional Risk	6	49	55
Total	29	30	89

MUST: Malnutrition Universal Screening Tool SGA: Subjective Global Assessment.

Table 4: Nutritional Risk According to MUST and SGA Characteristics of Four Main Cancer Sites

Cancer sites	MUST			% Risk	SGA			% Risk
	No risk	Mod. Risk	Severe risk		Normal nutrition	Moderate malnutrition	Severe malnutrition	
Breast (N=30)	14	11	5	53	17	13	-	44
Cervix (N=27)	11	10	6	60	8	19	-	70
Head and Neck (N=21)	6	6	9	70	5	12	4	78
GIT (N=3)	1	1	1	67	0	3	-	100

disease. Malnutrition in cancer patients increases the risk of infection, delays wound healing and increases treatment toxicity. These lead to prolonged hospital stay and increased health-related costs. Unfortunately, this aspect of oncology care is often neglected by oncologists. A study in the United Kingdom has shown that 80% of specialist oncological trainees expressed a lack of confidence or uncertainty in their ability to identify malnutrition and a similar report also came from studies among United States radiation oncologists [22]. In our study, 60% of our patients were malnourished ((SGA 59.8; MUST 60.8) Table **2**). This represents a high proportion of cancer patients and falls within reported rates 40-80% [23]. It was difficult to lay hands on local reports for comparison. In a report from a centre in Brazil, the prevalence of malnutrition was reported to be MUST 78.32%, SGA 77.08% [13]. In that report, however, the majority of the patients (72%) had gastro intestinal cancers which are thought to have at least 23 times more chances of presenting nutritional risk when compared to those with cancer in other sites [13]. In our study, only 3% of the patients had GIT cancers while breast cancer patients were the highest (34%) followed by patients with cervical cancer (30%) (Figure **2**). It is also to be noted that breast and prostate cancers are associated with lower weight loss compared with patients with cancer in most other sites [17].

However, our report also shows that the patients with GIT related-malignancies had the highest rate of malnutrition, followed by those with head and neck cancers 67% and 70% MUST and (100% and 78% SGA respectively (Table **4**)). Thus, all the patients with GIT and head and neck related malignancies had close to seventy percent chance of being malnourished similar to a previous study [24]. In the study, Righini and colleagues (2013) reported on 169 patients with head and neck cancers,that 82 (48.5%) patients were malnourished [24]. Although the sample sizes are small in our report, it reflects the problems associated with food intake and digestion which are associated with cancers in GIT and head and neck regions. Other reports have also associated increased risk of malnutrition in patients with cancer in these two sites [13,17,25]. In head and neck malignancies, dysphagia as well as xerostomia, problems with mastication, mucositis and nausea, are often very troublesome before, during and after oncology treatment predisposing the patients to malnutrition [26]. Thus, emphasizing the need for high index of suspicion of malnutrition in patients with above malignancies. In these patients, correction of nutritional deficiencies are sometimes challenging, in that the common routes of food ingestion and sites/organs of food digestion are affected.

In our study, the risk of malnutrition among the patients using MUST and SGA tools were similar (60.8% and 59.8% respectively). The convergence test between malnutrition assessment scores using MUST and SGA tools in this study showed moderate convergence with a Kappa coefficient of 0.584, $p<0.0005$; 95% CI 0.410- 0.758) Table **3**. However, this is comparable to a report by Boules and colleagues, in which the convergence between MUST and SGA scores was substantial (k=0.799; 95% CI 0.678- 0.919) [13]. There are other reports that also support the convergence of the MUST and SGA tools [17]. The MUST tool is less detailed; it can be used for quick screening of cancer patients to identify those at risk of malnutrition for further evaluation. The aim of nutritional screening is to identify patients at risk of malnutrition in a simple and non-invasive way [27]. After that, a more detailed evaluation (nutritional assessment) to confirm and classify the degree of malnutrition will follow.

CONCLUSION

This study described a high percentage (60%) of cancer patients to be at risk of malnutrition or who were found to be malnourished with the highest percentage

in those with head and neck and GIT malignancies. Thus confirming that a large proportion of our cancer patients need nutritional screening to identify those with the potential risk of malnutrition so that appropriate intervention can be planned for optimal treatment outcome. There was a convergence between the results obtained with MUST and SGA in detecting nutritional risk in this group of patients indicating that the MUST scale is a simple tool for screening cancer patients for nutritional risk while the SGA scale can be used for assessing those at risk for nutritional interventions.

LIMITATIONS OF THE STUDY

This study has some limitations in that a small number of patients met the study criteria during the study period. Furthermore, the participants were mostly outpatients who were relatively in good general health as in-patients are more likely to suffer from malnutrition than outpatients. All the patients in this study had a diagnosis of solid tumours. Patients with haematological malignancies were not included. This may make the results not generalizable to all cancer patients in the centre.

RECOMMENDATION

There is need to institute routine nutritional screening services for cancer patients for prompt identification of those at risk, treatment, and monitoring of malnourished patients. MUST tool is a simple, reliable tool that can be used for quick screening to identify those at risk of malnutrition. Other tools such as SGA and other anthropometric and laboratory measurements can then be applied to determine and classify the degree of individual nutritional needs for appropriate intervention.

FUTURE PERSPECTIVES

This study has provided baseline data on the nutritional profile of cancer patients in our practice. This preliminary data would inform a future study on a larger population for a better appreciation of the problem in our country. Hence, providing the basis for the design and commencement of nutritional care in oncology management scheme, as an integral part of cancer care in our institution.

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CONFLICTS OF INTEREST

None declared by the authors.

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