



ASSESSING OF MALNUTRITION IN PATIENTS WITH CANCER BY USING PATIENT-GENERATED SUBJECTIVE GLOBAL ASSESSMENT SHORT FORM (PG-SGA-SF)

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ABSTRACT

Introduction: Cancer-related malnutrition has negative consequences are taken too lightly in most oncology wards. The objective of this study is to determine the malnutrition risk (MR)/malnutrition (MN) in cancer patients using PG-SGA short form.

Methods: This cross sectional study was conducted with cancer patients in oncology unit at Benghazi medical center on 229 patients in which 107 male and 122 female. The data collected through PG-SGA short form and analyzed by either frequencies or by using Chi-square for significant differences.

Results and discussion: The study enrolled 229 oncology patients. The mean age was 58.34 ± 11.60 years. One hundred and twenty two (53.7.3%) of the patients were female. The most common three tumor types were breast tumors (27.9%) followed by colorectal cancer (14%) whereas, almost similar report for lung, liver and upper GIT (10.9%), (11.4%) and (11.8%) respectively. The mean BMI of the patients was 26.17 ± 0.3 kg/m². According to PG-SGA short form of the patients were in moderate risk of nutritional status and overall score of PG-SGA short form was 18.34 ± 0.56 . Furthermore the prevalence of cancer in this study was significant high in male ($P < 0.05$)

Conclusion: In cancer patients, the risk of malnutrition is significantly high, and this may alter the patient's life quality and expectancy. Therefore, the nutritional status of the patient that is diagnosed with cancer should be assessed in early stages of the disease.

KEYWORDS: malnutrition, cancer, PG-SGA Nutrition Assessments

INTRODUCTION

Cancer-related malnutrition has negative impact and undertaking in most oncology wards [1]. There are many studies reported that malnutrition prevalence ranging from 25% to over 70% based on nutritional assessments. Certainly, people suffering from cancer are among the most malnourished of all patient groups [2-7]. Unfortunately, the health team particularly clinicians often miss malnutrition risk in cancer patients [8]. In addition, when malnutrition risk is recognized, it may not be adequately addressed. There is evidence from European hospitals showed that only one third of cancer patients at risk of malnutrition in fact received nutritional support [9-11]. The consequences of malnutrition will become serious if goes untreated, consequences can be serious [11].

Malnutrition led to increase the financial costs for managing cancer patients, which involvement the costs for longer hospital stays and higher rates of complications following cancer-related therapy [12]. Recent growing evidence shown that the most severe, patients who were malnourished had a 2- to 5-fold higher risk of dying compared to patients with little or no malnutrition [13]. Indeed, due to generally lack or low awareness of cancer-associated malnutrition, the strategies were overlooked by many oncologist for taking early actions to prevent and treat anorexia, cachexia, and sarcopenia [14]. Furthermore, malnutrition in patients with cancer are a result from insufficient nutritional intake that lead to a depletion of body stores of fat and lean mass, and



eventually result in reduced physical function [15]. People with cancer may have appetite loss resulting from altered appetite signals [16].

With cancer progress, the loss of skeletal muscle is considered the potent negative prognostic factor for people of any body mass index (BMI) [17]. Furthermore, when skeletal muscle mass loss there will be higher risk of toxicity from chemotherapy, which result in reducing time to tumor progression, poor surgical outcome, physical disability, and increased mortality [18].

The Patient-Generated Subjective Global Assessment (PG-SGA) is well established in clinical setting as the reference method for assessing nutrition status in patients with cancer [19]. The modified version of the nutritional assessment instrument Subjective Global Assessment can be completed by the patients, and have been used as a method for screening of nutritional risk/ deficit and is referred to as PG-SGA Short Form [20].

In Libya the incidence of cancer is lower than other neighbored countries and according to previous work the top two frequently diagnosed malignancies in males were lung cancer (19%) and colorectal cancer (10%) and among females, include breast cancer (26%), and colon and rectum cancer [21]. Considerably, according to the literature, in Libya, cancer is second main cause of death (13 %) after cardiovascular disease (37 %) [22]. Therefore, the aim of the present study was to investigate malnutrition in patients with cancer by using PG-SGA short form.

MATERIAL AND METHODS

Subjects and Methods

Cross sectional study were conducted for all subjects (aged 18 y and over) from oncology unit at Benghazi medical center from beginning of January to end of March. Male and female included in the study were 107 and 122 respectively. Exclusion criteria were those younger than 18 years old and recently diagnosed cancer. Weight of the patients were measured at nearest 0.1 kg and height of the patients were also measured nearest 0.2 cm by weight balance SECA and Tape meter. BMI calculated as describe and categorized by WHO [23] through body weight in Kg divided height in meter Square while BMI categorized according to WHO [23] if <18.5 underweight, 18.5-24.9 normal weight, 25-29.9 overweight and 30 and more is obese.

Nutritional Assessment

Nutritional status was assessed by PG-SGA Short Form. The English version of PG-SGA Short form was used in this work [24]. The PG-SGA Short form consisting of four text boxes include Box 1, patients report on current and former body weight; Box 2, changes in food intake and current type of food/nutritional intake; Box 3 nutritional impact symptoms and other factors influence food intake/absorption/utilization of nutrients; and lastly Box 4, for activities and function [24]. The numerical scoring was presented as range from 0 (no problems) to 36 (worst problem). For details Box 1 has a maximum score of 5, Box 2 has a maximum score of 4, Box 3 has a maximum score of 24, and Box 4 has a maximum score of 3.

According to PG-SGA Short form the risk of malnutrition was categorized as following: low (PG-SGA SF 0-3, SNAQ 0-1 points), medium (resp. 4-8 and 2 points), and high risk (resp. ≥ 9 and ≥ 3 points). In addition, malnutrition was defined as PG-SGA Stage B (moderate/suspected malnutrition) or Stage C (severely malnourished).

Statistical analysis and ethics

Statistical analyses were conducted using Statistical Package for Social Science 23.0 (SPSS) statistics program. Statistical significance was set at $p < 0.05$. The descriptive analyses of the normally distributed variables were presented as mean and standard deviation.

Categorical data was assessed using the Chi-square test or Fisher's exact test while quantitative data analyzed by T test.

The ethical approval was obtained from the local Ethical Commission of Benghazi medical center by formal consent.

RESULTS

Two hundred twenty nine patients gave their consent to participate in the study, resulting in a response rate of 99%. Data for the 229 participants (aged 20-86 years old) with mean age was 58.34 ± 11.60 years; 46.7% male and 53.3% were female included (Table 1). The age groups between 41-60 years old were predominant which represent 60.3% ($p < 0.05$) followed by age groups 61-86 years old and 24-40 years old 28.4% and 10.5% respectively and being least were age group between 20-25 years old (0.9%) (Table 2).

Table 1: Gender distribution of the patients



Gender	N	N %
Male	107	46.7%
female	122	53.3%
Total	229	100.0%

Table 2: Age Distribution of the patients

Ages (Year)	Count	Column N %	P values
20-25	2	0.9%	0.000
26-40	24	10.5%	
41-60	138	60.3%	
61-86	65	28.4%	
Total	229	100.0%	

Chi-square test was performed and considered significant at $\alpha < 0.5$

Types of cancer have been investigated among patients, by which more cancer reported is that breast (27.9%) followed by colorectal cancer 14% whereas, almost similar report for lung, liver and upper GIT 10.9%, 11.4% and 11.8% respectively. Gynecology and bone were recorded by 5.7% and 5.2% respectively. Brain being lowest reported (3.5%) table (3).

Table 3: Types of cancers among the participants

Types of cancer	N	N %
breast	64	27.9%
Colorectal	32	14.0%
lung	25	10.9%
Liver and pancreas	26	11.4%
Upper GIT	27	11.8%
Prostate	8	3.5%
Gynecology	13	5.7%
brain	8	3.5%
bone	12	5.2%
Other (renal, skin, leukemia and thyroid)	14	6.1%
Total	229	100.0%

In regarding Types of cancer among male and female as shown in table 9, breast and Gynecology cancers were confined to the female while prostate cancer confined to the male. The highest significant ($p > 0.05$) of cancer in male were as following lung, liver, brain and bone, whereas non-significant increased upper GIT and other cancer have been reported. (Table 4).



Table 4: Types of cancer among the participants:

Types of cancer	Gender						P values
	Male		Female		Total		
	N	N %	N	N %	N	N %	
breast	0	0.0%	64	52.5%	64	27.9%	0.43 0.000 0.019 0.17 0.034 0.021 0.12
colorectal	15	14.0%	17	13.9%	32	14.0%	
lung	22	20.6%	3	2.5%	25	10.9%	
Liver and pancreas	19	17.8%	7	5.7%	26	11.4%	
Upper GIT	17	15.9%	10	8.2%	27	11.8%	
Prostate	8	7.5%	0	0.0%	8	3.5%	
Gynecology	0	0.0%	13	10.7%	13	5.7%	
Brain	7	6.5%	1	0.8%	8	3.5%	
Bone	10	9.3%	2	1.6%	12	5.2%	
Others(renal, skin, leukemia, thyroid)	9	8.4%	5	4.1%	14	6.1%	

Chi-square test was performed and considered significant at $\alpha < 0.5$

In the table 5 A, BMI for the participants shown that, normal body weight was dominant and presented by about 44% while overweight came in the second with 38.9%, obese participants represent by 13.1%, and underweights were being the least 4.4%. The percentages of significant weight loss during the last month was reported approximately 4.34% by which patients have moderate malnutrition (Table 5B).

Table 5 A: BMI categories among participants:

BMI categories	N (N%)
Underweight	10 (4.4%)
Normal weight	100 (43.7%)
Overweight	89 (38.9%)
Obese	30 (13.1%)
Total	229 (100%)

Table 5 B: Body mass index and percentages weight loss

	Mean \pm SEM
Current BMI	26.17 \pm 0.38
Last month BMI	27.19 \pm 0.42
Weight loss during last month	4.34%

In the analyses of PG-SGA SF presented in Table 6 the first component Box 1 is regarding weight status and weight changes during the last was shown that 69.1% of the participants have significant weight reduction ($P < 0.000$) (Table 6).

Table 6: Components of PG-SGA Short Form weight changes (Box 1)

Weight of the patients during last two weeks (Box 1)	N	N %	P values
Increase	31	13.5%	0.000
Decreased	160	69.0%	
Unchanged	38	16.5%	
Total	229	100.0%	

Chi-square test was performed and considered significant at $\alpha < 0.5$



Furthermore analysis of Box 2 in PG-SGA SF which presented the food intake of the participants in which, 73% of participants reported that their intake last month is less than normal this means decreased food intake which presented in patients indicated that patients have moderate malnutrition (Table 7 A).

Table 7 A: Components of PG-SGA Short Form food intakes (Box 2)

Food intake (rate my intake during the past month (Box 2)	Count	Column N %	P values
unchanged	57	24.9%	0.000
less than normal	167	72.9%	
more than normal	5	2.2%	
Total	229	100.0%	

Chi-square test was performed and considered significant at $\alpha < 0.5$

However further analysis of food intake of participant in Box 2 of PG-SGA Short Form found that current food intake, by which very little of anything reported the highest percentages among the participants (55%) (Table 7 B).

Table 7 B: Components of PG-SGA Short Form food intakes (Box 2)

Food intake (I am now taking) (Box 2)	N (N%)
normal food but less than normal	48/229 (21%)
little solid food	0/229 (0%)
only liquid	9/229 (3.9%)
only nutritional supplements	26/229 (13.4%)
very little of anything	126/229 (55%)
only tube feeding or only nutrition by vein	8/229 (3.5%)

In the PG-SGA Short Form, the third component of assessing nutritional status of the participants were that, symptoms (Box 3), most participants reported that 82.5% and 71.6% for nausea and no appetite respectively. In general the rest of the symptoms in the Box 3 of PG-SGA Short Form were found less than 50% (Table 8 A).

Table 8 A: Components of PG-SGA Short Form symptoms (Box 3)

Symptoms (Box 3)	N (N%)
no problem eating	36/229 (15.8)
no appetite	164/229 (71.6)
nausea	189/229 (82.5%)
constipation	95/229 (41.5%)
mouth sore	95/229 (41.5)
things taste funny or have no taste	103/229 (45%)
problems swallowing	106/229 (46.3)



The analysis of PG-SGA Short Form in the Box 3 shown that, participants were highly reported the following symptoms: vomiting, diarrhea, dry mouth, smell bother me, fell full quickly, and fatigue as 51.3%, 51.3%, 76.4%, 65.5%, 53.7% and 91.3% respectively (Table 8 B).

Table 8 B: Components of PG-SGA Short Form symptoms (Box 3)

Symptoms (Box 3)	N (N%)	
Pain: where	No	160(69.8)
	abdominal	6 (2.6%)
	Back/ Joint pain	45 (19.6)
	chest	3(1.3%)
	general pain	6(2.6%)
	headache	5(2.2%)
	shoulder	4(1.7%)
	Total	229 (100%)
vomiting	117/229 (51.3%)	
diarrhea	117/229 (51.3%)	
dry mouth	175/229 (76.4%)	
smell bother me	150/229 (65.5%)	
fell full quickly	123/229 (53.7%)	
fatigue	209/229 (91.3%)	

In the last part of PG-SGA Short Form (Box 4) which represent the function and activities of patients. Approximately 39.3% of the participants reported that able to little activity spend most of the day in bed or chair while the remaining of the Box 4 components reported les that 28% (Table 9).

Table 9: Components of PG-SGA Short Form activities and functions (Box 4)

Activities and function of the patients over the past month (Box 4)	N (N%)
normal with no limitation	25/229 (11%)
not my normal self but able to up and about with fairly normal activities	56/229 (24.5)
not feeling up to most things but in the bed or chair less half the day	64/229 (27.9%)
able to little activity spend most of the day in bed or chair Yes	90/229 (39.3%)
pretty much bed ridden out of bed Yes	38/229 (16.6%)



For the assessing of malnutrition for the participants by scoring or points each components of PG-SGA Short Form, the PG-SGA short form questionnaire categorized the total points as the following low risk malnutrition (0-3 points), medium risk malnutrition(4-8 points) high risk malnutrition (≥ 9 points).

The result in table 10, found that total points were 18.34 which mean patients have or needs for improved symptoms managements and or nutrients intervention options according to PG-SGA Short Form listed (Table 10).

Table 10: Categories of PG-SGA SF components

Categories of PG-SGA SF	Mean \pm SEM
Weight changes (Box1)	0.71 \pm 0.03
Food intake (Box 2)	2.86 \pm 0.10
Symptoms (Box 3)	12.28 \pm 0.41
Activities (Box 4)	2.49 \pm 0.12
Total points (scores)	18.34 \pm 0.56

Table 11 shown that all types of cancer reported total points > 9 , this indicated patient have high risk malnutrition which mean all participants need for improved symptoms managements and or nutrients intervention options (Table 11).

Table 11: Malnutrition Risk Among The Participants

Types of cancer	weight status (Box 1)	food intake (Box 2)	Symptoms (Box 3)	activities and function (Box 3)	Risk malnutrition
	Mean \pm SEM	Mean \pm SEM	Mean \pm SEM	Mean \pm SEM	Total Mean \pm SEM
Breast	.69 \pm 0.6	2.64 \pm 0.19	11.86 \pm 0.75	2.50 \pm 0.26	17.69 \pm 1.07 (high)
Colorectal cancer	.78 \pm 0.7	2.69 \pm 0.20	11.53 \pm 1	2.44 \pm 0.29	17.44 \pm 1.44 (high)
lung	.68 \pm 0.1	2.96 \pm 0.24	12.92 \pm 1.25	2.08 \pm 0.24	18.64 \pm 1.6 (high)
Liver and pancreatic	.62 \pm 0.1	2.96 \pm 0.16	12.23 \pm 2.1	2.38 \pm 0.22	18.19 \pm 1.7 (high)
Upper GIT	.70 \pm 0.19	3.19 \pm 0.11	12.26 \pm 2.1	2.30 \pm 0.24	18.44 \pm 1.8 (high)
Prostate	.75 \pm 0.16	3.00 \pm 0.11	12.00 \pm 2.5	3.88 \pm 0.26	19.63 \pm 3.4 (high)
Gynecology	.85 \pm 0.14	3.00 \pm 0.9	11.62 \pm 2.5	1.85 \pm 0.21	17.31 \pm 2.5 (high)
Brain	.75 \pm 0.11	3.00 \pm 0.10	14.25 \pm 2.6	2.75 \pm 0.25	20.75 \pm 3.1 (high)
Bone	.67 \pm 0.10	3.17 \pm 0.11	13.75 \pm 2.1	2.58 \pm 0.28	20.17 \pm 2.2 (high)
Others (renal, skin, leukemia, thyroids)	.79 \pm 0.10	2.79 \pm 0.12	13.21 \pm 2.2	3.50 \pm 0.25	20.29 \pm 2.5 (high)
Total	.71 \pm 0.11	2.86 \pm 0.23	12.28 \pm 2.4	2.49 \pm 2.05	18.34 \pm 2.7 (high)

In the next step, further investigation of malnutrition through percentages of weight loss. According to PG-SGA Short Form, moderate malnutrition if weight loss during one month is $\leq 5\%$ and severe malnutrition if weight loss during last month is $> 5\%$. The result in the table 12 shown that all participants with types of cancers have moderate risk of malnutrition except those participants with brain cancer have sever risk of malnutrition.

Table 12: Types of cancers , percentages of weight loss and risk of malnutrition:

Types of cancer	Weight loss during last month	Risk of malnutrition
	Mean± SEM	
Breast	4.46± 1.03	Moderate
Colorectal	3.67± 2.03	Moderate
Lung	1.02± 1	moderate
Liver and pancreatic	4.01± 2.23	Moderate
Upper GIT	3.98± 2.08	Moderate
Prostate	4.51± 3	Moderate
Gynecology	1.06± 0.4	Moderate
Brain	7.45± 3.2	Severe
Bone	1.31± 1	Moderate
Other (renal, skin, leukemia, thyroid)	0.61± 0.1	Moderate

DISCUSSION

In the oncology population where malnutrition is high, more descriptive screening tools is needed to give further information for assessing triaging and capture acute change. Among the effective screening tool is The Patient-Generated Subjective Global Assessment Short Form (PG-SGA SF) is a which used for descriptive nutrition screening [25].

The present study reveal that, the prevalent of cancer among male and female was shown by 46.7% and 53.3% respectively, because this study include the participant have different types of cancers. In regard the ages, All participants (aged 18 y and over) commencing radiotherapy or chemotherapy. The most age groups affected by cancer those between 41-60 years old ($p < 0.05$) this find also confirmed in numbers of studies [26, 27]. However, some studies found that cancer mostly confined to age groups over 60 years old [28-31].

Regarding types of cancers our study shown that breast cancer reported the highest number (27.9%) followed by colorectal cancer 14% whereas, almost similar report for lung, liver and upper GIT 10.9%, 11.4% and 11.8% respectively. Gynecology and bone were recorded by 5.7% and 5.2% respectively. Brain being lowest reported (3.5%). This figures were first highlighted in the present works. These trends were also in consistent with previous work by Davies by which the most prevalent tumors corresponded to breast, lung and colorectal cancer [32]. On the other hands, some researchers reported that the most prevalent cancer is colorectal, other GIT and breast cancer respectively [9,11]. Furthermore, that data collected from department of oncology in Benghazi medical center revealed that significant increased lung, liver and pancreas, bone and as well as brain cancer in male ($P < 0.05$). In compare to male, breast, colorectal and gynecological cancer increased in female. These data were also established somewhere else [33, 34]. On the other hands, in the previous works colorectal cancers were more predominant in male and this result was not consistent with the present work [35].

In regarding BMI, the overall BMI of patients were overweight, by analyzed and categorized BMI revealed that approximately 45% of patients have normal body weight whereas more than 50% have been found overweight and obesity. Such works have been proved by Elena and et al [36], Unsal and et al [37] and Broeke and etal [38].

In the PG-SGA Short form (consisting of four text boxes), patients report on current and former body weight (Box 1); changes in food intake and current type of food/nutritional intake (Box 2); nutritional impact symptoms and other factors that negatively influence food intake/absorption/utilization of nutrients (Box 3); and activities and (Box 4). Further analysis of patients response to the questions in Box 1 (weight changes) were found significantly decreased ($p < 0.05$) body weight during the last weeks (69%). This could be contribute to overall 4.3% weight changes for all patients during the last month. However, about 39% and 13% of the patients have had either overweight or obesity respectively. The net weight loss reported for all BMI categories and weight changes by 4.3% this is the fact that indicated by significant decreased boy weight reported by patients in Box 1 question of PG-SGA Short form. Furthermore, based on PG-SGA Short form classification of weight loss $\leq 5\%$ during the last 2 weeks indicated that patients have moderate malnutrition. The moderate malnutrition found in this study was not similar to that reported by Unsal and et al [37] by which high percentages of patients were low malnutrition. Although, Elen and et al [36] found that moderate malnutrition presented as much as 76%. Further interpretation for moderate malnutrition just due to changes in food intake and current type of food/nutritional intake (Box 2) of PG-SGA Short which shown that about 73% of patients suffering



from less food intake than normal ($p < 0.05$) or very little intake of anything (54%). In addition, the PG-SGA Short Form, in the third component of assessing nutritional status of the participants were that, symptoms (Box 3), most participants reported that 82.5% and 71.6% for nausea and no appetite respectively. These factors could contribute to malnutrition among the patients. Moreover, analysis of PG-SGA Short Form in the Box 3 shown that, participants were highly reported vomiting, diarrhea, dry mouth, smell bother me, fell full quickly, and fatigue as 51.3%, 51.3%, 76.4%, 65.5%, 53.7% and 91.3% respectively and those symptoms further implicated in loss of appetites and weight loss.

Further analysis of weight loss for each cancer shown that, all types of cancer with except of brain have moderate risk of malnutrition risk and for brain severe malnutrition risk. The result obtained from the present study considered highlighted finding because neither studies were consistent with the present finding. In the studies conducted by [39, 40] in patients with different types of cancers which were not similar to the our patients, the risk of malnutrition was moderately as overall risks by using Nutriscore.

While those studies used PG-SGA as a tool for assessing malnutrition pointed out the overall malnutrition as percentages [41, 42] Only very few studies were figure out malnutrition as moderately after used PG-SGA total score [24, 25].

The total scores or points obtained in this study from PG-SGA were 18 which considered as high as than those previously described [43] and those patients need for improved symptoms managements and or nutrients intervention options. These result could be probably what were reported individually in PG-SGA components.

In sum, the present work highlighted some points by which all types of cancer have high risk of malnutrition which could be prone to protein energy malnutrition or cachexia. Furthermore all patients in studied samples need for improved symptoms managements and or nutrients intervention options. The prevalence of cancer was high in man. This study need to validity in large samples. Its highly recommended that nutrition screening and assessment strongly advocated in order to minimized protein energy malnutrition and/ or sarcopenia.

CONCLUSION

The present work reveal that, cancer prevalent was more predominate in female, and the most age affected by cancer those age groups between 41-60 years old, some types of cancer significant increase in male include lung, liver, bone and brain. On the words female patients have found increased breast, colorectal and gynecological cancer. Overall mean BMI of patients were overweight. Body mass indices reveal that approximately 45% of patients eutrophic weight and more than 50% were overweight and obese. Overall significant weight loss during the last months were 4.34% and this indicated that patients suffering from moderate malnutrition. About 73% of patients suffering from less intake of foods. Furthermore, the overall mean of PG-SGA SF score was 18 which mean patients have high risk for malnutrition and need for improved symptoms managements and or nutrients intervention options.

Conflict of Interest

No conflict of interest.

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