Original Article

Assessment of nutritional status using abridged scored patient-generated subjective global assessment in cancer patient

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ABSTRACT

Context: Malnutrition is a common problem among cancer patients, usually occurs due to poor appetite, low food intake, and changes in body metabolism.

Aims: The aim of this study is to determine the prevalence of malnutrition in patients receiving chemotherapy on an outpatient basis.

Settings and Design: This cross-sectional study conducted on 300 cancer patients referred to hospital.

Subjects and Methods: The prevalence of malnutrition among patients was assessed using the abridged scored patient-generated subjective global assessment (abPG-SGA) standard questionnaire. Moreover, patient's weight and 24 h dietary recall were measured.

Statistical Analysis Used: Descriptive statistics were used to present characteristics of patients and dietary recalls. For revealing the correlation, Spearman correlation was used.

Results: The average abPG-SGA score was 7.6 (standard deviation [SD] = 5.4) and 60.7% of patients were malnourished and required nutritional intervention. Patients mean age and mean duration of illness were 54.2 (SD = 14.7(years, 25 months, respectively. The most common complaint of patients included fatigue (51.3%), anorexia (43.3%), and dry mouth (41%). Reduction in food intake in past month was reported by 41.7% of patients.

Conclusion: According to the high prevalence of cancers and increasing growth of them in recent years with regard to outpatient treatment development for cancer patients, using the abPG-SGA standard questionnaire by nutritionist or nurses can be effective to detect malnourished patients and reduce complications caused by disease.

KEY WORDS: Abridged scored patient-generated subjective global assessment, cancer, malnutrition

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INTRODUCTION

Cancer is the leading cause of death in developed countries. According to the current estimates, cancer is the third leading cause of death in Iran after coronary heart disease and accidents.[1] The burden of cancer has been increased more than twice over three decades.[2] Changes in lifestyles, dietary pattern, physical activity, and an increase of life expectancy are the reasons of increment in cancer burden in developing countries. Almost 60% of new cases of cancer and cancer-related deaths happened in developing countries. Based on some epidemiological studies, the incidence rate of cancer in Iran is estimated 98–100 per 100,000 population annually.[3]

Malnutrition occurs more frequently in patients with cancer and is one of the most important complication in cancer patients due to their increased needs to energy and nutrients as a result of high metabolic rate.[4] Some pathological changes in metabolic pathways occurred in cancer situation, which cause increment in protein catabolism, muscle protein degradation, and lipid oxidation.[5] Moreover, patients with cancer have a poor appetite that subsequently reduced their food intake. Indeed, malnutrition can be appeared quickly because reduced food intake and metabolic changes can couple together. The incidence of malnutrition in cancer patients

reported between 40% and 80%,[6] and about 20% of cancer patient died because of malnutrition.[7] With early nutritional assessment of malnutrition and nutritional intervention, we can reduce the rate of mortality and morbidity in these patients. Despite the importance of malnutrition in the prognosis of the patients with cancer, its screening is usually ignored in our hospitals.[7]

Scored patient-generated subjective global assessment (PG-SGA) is one of the accepted standard tools for assessing the nutritional status of patients is scored. It has already used by the Oncology Nutrition Dietetic Practice Group of the American Dietetic Association.[8] Based on Bauer *et al.* report, PG-SGA score is related to weight loss during the last 6 months in patients with cancer.[9] Isenring *et al.* showed PG-SGA is an effective nutrition assessment tool for ambulatory patients receiving radiotherapy.[10] Li *et al.* studied on patients with lung cancer reported that PG-SGA is an appropriate questionnaire for identifying malnutrition in these patients.[11] In last decade, few studies reported the incidence of malnutrition in Iranian cancer patients, but there is no new report about this. In a study by Khoshnevis *et al.*, a high prevalence of malnutrition has represented in Iranian cancer patients and according to PG-SGA scores, 96% of patients needed serious treatment.[12] In Yeganeh *et al.*'s study, that followed up 71 patients during chemotherapy, All of the dead patients ($n = 21$) and 76% of alive ones ($n = 50$) had malnutrition.[13] According to recent statistics, incidence of cancer in Isfahan province (in center of Iran) has been increasing about 4 per 100 population in recent years.[3] Unfortunately, there is no study regarding nutritional issues in this group of patients. In this study, we used abridged scored patient-generated subjective global assessment (abPG-SGA is a short version of the PG-SGA) for evaluation of weight loss, dietary intake, nutritional complications, physical activity, and requirement of nutrition interventions for patients with cancer in an outpatient setting. Its validity confirmed by Gabrielson *et al.*'s study.[14] The purpose of our study was to evaluate the nutritional status in cancer patients.

SUBJECTS AND METHODS

This cross-sectional study was carried out in 2014 among outpatients oncology setting in Isfahan. All 300 participants agreed to take apart in this study and answered to all questions. Patients who were younger than 18 years or could not remember their pervious weight or were unable to answer all the questions did not involve in the study. Questionnaire for each patient was completed by trained nutritionists. For current weight, we used medical records of patients or measured their weight with hospital scales when patient was minimally clothed. Height was measured by using a tape while the subjects were standing. When patients were unable to standing, we used indirect method of measuring height (knee height) (men [height in centimeters]: $64.19 - [0.04 \times age] + [2.02 \times knee\ height\ in\ centimeters]$ women [height in centimeters]: $84.8 - [0.24 \times age] + [1.83 \times knee\ height\ in\ centimeters]$). Body mass index (BMI) was calculated as weight in kilograms divided by square of height in meters and percentage of weight loss during last 6 months. Age and diagnosis were extracted from medical charts.

For evaluation of nutrition status, we used abPG-SGA.[14] The abPG-SGA is a short version of PG-SGA and contains the first worksheet including four questions of original version of PG-SGA. The abPG-SGA has some questions about weight, dietary intake, symptoms, activities and functions and does not contain physical exam, disease/condition, and metabolic considerations. The abPG-SGA score was calculated by summing up box 1 to box 4 of the questionnaire. Total scores for abPG-SGA range between 0 and 35. High sensitivity (93.8%) and specificity (77.6%) were reported for a cut-off score of ≥6 for abPG-SGA. Best cut-off point for abPG-SGA is 6 and according to it, patients were divided into malnourished group (required intervention) and patients without malnutrition.

According to Khoshnevis *et al.*'s study,[12] severity of nutritional symptom was classified as following: score >6 – severe symptom, moderate symptoms were between 3 and 6 score and mild symptoms were <3. It means that patients with scores higher than 6 were classified as malnourished patients that need intensive care.

We used in-person interviews for evaluating nutritional status and nutritional adequacy (macronutrient and micronutrient). The type and amount of food that consumed for last 24 h (24 h recall) were asked by trained nutritionist. All recalls were analyzed with the Nutritionist-4 software.

All statistical analyses were carried out using the Statistical Package for Social Sciences (Version 16:0, SPSS Inc., Chicago, IL). Descriptive statistics were used to present characteristics of patients and dietary recalls. Spearman correlation used for revealing the existence of a correlation. The effect of main variables such as weight loss, physical activities, nutritional symptoms, and abPG-SGA were examined by regression analysis. One sample *t*-test was conducted for comparing nutrient intake with estimated average recommendation (EAR). Data are presented as a mean ± standard error of mean. $P \leq 0.05$ was considered as statistically significant.

RESULTS

Abridged scored patient-generated subjective global assessment

In this study, 178 female (59.3%) and 122 male (40.7%) were assessed by abPG-SGA questionnaire. The mean age was 54.2 years (standard deviation [SD] = 14.7) and the average duration of illness was 25 months. Gastrointestinal cancer (24.7%) and breast cancer (24%) had the highest prevalence. Fatigue (51.3%), no appetite (43.3%), and dry

mouth (41%) were the most frequent nutritional symptoms. Only 2.7% of patients had a minimum of physical activity, and 49.3% had normal activity and function [Table 1]. Reduction in food intake was reported in 125 patients (41.7%). The average weight loss in last month was 0.92 kg and 3.70 kg in last 6 months [Table 2]. Mean decrease of BMI during last 6 months was 1.33 ± 2.97 kg/m².

The mean score of abPG-SGA was 7.6 (SD = 5.4). Severe and mild nutrition symptoms were reported in 112 patients (37.3%) and 115 patients (38.3%), respectively. Altogether, 182 patients (60.7%) were malnourished and needed nutritional intervention, and 118 patients (39.3%) did not have malnutrition.

Between more common cancers type (blood, breast, lymphoma, female genital, male genital, and gastrointestinal), 63.6% of patients with lymphoma cancer had malnutrition and patients with male genital cancer had the lowest prevalence of malnutrition (20%).

Table 1: Prevalence of nutrition symptom causing food intake reduction nutrition impact symptoms and functional status (*n*=300)

	n (%)
Symptom*	
No appetite	130 (43.3)
Nausea	117 (39)
Vomiting	57 (19)
Constipation	111 (37)
Diarrhea	24 (8)
Dry mouth	123 (41)
Mouth sores	41 (13.7)
Things taste funny or no taste	33 (11)
Smells bother me	68 (22.7)
Problems swallowing	28 (9.3)
Feel full quickly	107 (35.7)
Pain	46 (15.3)
Fatigue	154 (51.3)
Activities and function	
Normal with no limitations	148 (49.3)
Not my normal self, but fairly normal activities	73 (24.3)
Not feeling up to most things, in bed/chair <½ day	38 (12.7)
Little activity, most of the day in bed/chair	33 (11.1)
Pretty much bedridden	8 (2.7)
Symptom grade	
Mild	115 (38.3)
Moderate	73 (24.3)
Severe	112 (37.3)

*Patients could indicate more than one symptom

Table 2: Average weight loss according to cancer type in last 1 and 6 months

Cancer type	Weight loss in last month (kg)	Weight loss in last 6 months (kg)
Blood	0.5096	3.2692
Breast	0.6944	1.2569
Lymphoma	0.7273	2.2727
Female genital	0.9333	0.2333
Male genital	1.1000	2.3000
Gastrointestinal	1.2365	6.7365
Other	1.2364	5.0182
Total	0.9233	3.7050

Findings from regression indicated that there was a significant relationship between severity of nutrition symptoms and abPG-SGA score ($r^2 = 0.752$, $P < 0001$). Moreover, we observed a significant relationship between the physical activity and abPG-SGA score ($r^2 = 0.456$, $P < 0001$). Accordingly, nutritional symptom predicted 75% of the abPG-SGA score.

The final abPG-SGA score significantly correlated with weight loss in last month ($r = 0.32$, $P < 0001$) and weight loss in last 6 months ($r = 0.31$, $P < 0001$).

Dietary recall
We analyzed just one 24 h-recall. Some patients were unable to describe type or amount of food of their previous day, so 171 dietary recalls were analyzed. Mean of energy intake for 105 women was 1392.6 kcal and for 61 men was 1572.3 kcal [Table 3].

Table 4 shows mean serving of each dietary group. Milk consumption was 0.48 ± 0.98 serving in women and 0.76 ± 0.86 serving in men. Women and men consumed 1.87 ± 0.72 and 1.67 ± 2.285 serving of vegetable, respectively. There was no significant difference between the dietary group in men and women. Estimated average recommendations (EARs) of micronutrients were almost adequate for all nutrients except for folate and selenium in men [Table 5]. Intake of EAR is shown in Table 6. Folate, calcium, and iron were consumed <75% of EAR.

DISCUSSION

The aim of this cross-sectional study was to determine malnutrition status among patients with cancer. The scored abPG-SGA was shown to be accurate for identifying the well-nourished patients from the malnourished ones. The scored PG-SGA and abPG-SGA consist of the symptoms and

Table 3: Energy and macronutrient intake in men and women participant

	Mean±SD	
	Women=105	Men=61
Kcal	1392.65±614.95	1572.37±802.45
Carbohydrate (g)	192.6±89.5	233.21±128.79
Protein (g)	54.56±31.45	58.67±38.47
Fat (g)	47.72±35.24	48.41±33.68

SD=Standard deviation

Table 4: Daily intake of food group in men and women (serving/day)

Dietary group	Mean±SD	
	Women	Men
Milk	0.48±0.98	0.76±0.86
Vegetable	1.87±3.72	1.67±2.85
Fruit	3.17±2.6	3.67±4.52
Bread	4.08±3.27	3.95±3.36
Meat	4.11±3.94	4.03±4.13
Fat	8.25±3.74	7.23±5.69

SD=Standard deviation

Table 5: Comprisal of dietary of some micronutrients recommended amounts of estimated average requirement

Nutrient	Women (mean±SD)	EAR for women	P	Men (mean±SD)	EAR for men	P
Vitamin A	913.63±1508.96	500 µg	0.006	1400.25±3627.86	625 µg	0.087
Vitamin C	78.66±77.94	60 mg	0.016	81.14±83.75	75 mg	0.553
Vitamin D	0.47±1.38	10 µg	0.00	0.59±0.28	10 µg	0.00
Vitamin E	2.08±5.44	12 mg	0.00	2.35±9.54	12 mg	0.00
Thiamin	1.11±0.59	0.9 mg	0.00	1.26±0.67	1 mg	0.002
Riboflavin	1.13±0.95	0.9 mg	0.012	1.59±2.16	1.1 mg	0.068
Niacin	17.71±10.61	11 mg	0.00	20.28±15.58	12 mg	0.00
Folate	147.36±139.71	320 µg	0.00	146.16±171.79	320 µg	0.00
Selenium	0.39±0.44	45 µg	0.00	0.03±0.31	45 µg	0.00
Zinc	5.99±4.23	6.8 mg	0.053	6.75±6.04	9.4 mg	0.001
Molybdenum	16.77±38.10	34 µg	0.00	13.56±17.72	34 µg	0.00

SD=Standard deviation, EAR=Estimated average requirement

Table 6: Percentage of adequate intake for micronutrients in men and women with cancer

Nutrient	RDA for women	Mean±SD	Adequacy %	RDA for men	Mean±SD	Adequacy %
Vitamin A	700 RE	913.63±1508.69	130	900 RE	1400.25±3627.86	155.5
Vitamin C	75 mg	78.66±77.94	104	90 mg	81.14±83.75	90.15
Vitamin D	15 µg	0.47±1.38	3.1	15 µg	0.59±1.28	3.9
Vitamin E	15 mg	2.08±5.44	13.8	15 mg	2.35±9.45	15.66
Vitamin k	90 µg	73.15±144.4	81.2	120 µg	44.98±49.94	37.48
Thiamin	1.1 mg	1.11±0.59	100	1.2 mg	1.26±0.67	105
Riboflavin	1.1 mg	1.13±0.95	102	1.3 mg	1.59±2.16	122.3
Niacin	14 mg	17.71±10.61	126.5	16 mg	20.28±155.58	126.75
Folate	400 µg	147.36±139.71	36.8	400 µg	146.16±171.79	36.45
Calcium	1200 mg	473.82±455.78	39.4	1100 mg	584.39±332.07	53.12
Iron	18 mg	12.3±6.6	68.3	8 mg	15.7±10.25	196.25
Molybdenum	45 µg	16.77±38.10	37.2	45 µg	13.56±1.72	30.13
Zinc	8 mg	5.99±4.23	74.8	11 mg	6.75±6.04	61.36

SD=Standard deviation, RDA=Recommended dietary allowances

conditions that may adversely affect nutritional status. The rate of malnutrition in this group of patients was 60.7%, and this is not unexpected as patients with cancer have the highest incidence of malnutrition.[15] Many patients experience some degree of malnutrition in the duration of treatment and chemotherapy. High prevalence of malnutrition in our study is consistent with other studies.[16,17] Unfortunately, malnutrition is considered as a usual side effect of chemotherapy. Results from other study showed treatment type has no significant relationship with the rate of malnutrition.[12] Thus, we should not consider weight loss and nutrition problems just as a consequence of chemotherapy. Anorexia that is defined as the loss of the desire to eat is common in patients with cancer.[18] Neuropeptides including interleukin (IL)-1α, IL-1 β, and IL-6 as well as tumor necrosis factor-α can cause anorexia.[19] Different type of energy expenditure and macronutrient metabolism in cancer can cause weight loss and wasting. This study cannot explain the possible mechanisms of weight loss and occurrence of malnutrition but can show the importance of evaluation of malnutrition in patients with cancer.

Nutrition is not a static condition, and just one assessment of nutrition problems or malnutrition is not enough or logical for progressive diseases such as all type of cancers. Continuous nutritional assessment and intervention for these patients are necessary.

Reporting changes in BMI is not an adequate marker for nutritional assessment. It is not sensitive indicator for protein-energy malnutrition because it could not state differences between fat-free mass and body fat mass.[20] Therefore, assessment of other indices such as triceps skin fold, mid arm circumference, and arm muscle area for the distribution of fat mass and muscles status is required.[13]

We used just one dietary recall and according to its limitations, we cannot assess intake of fat soluble vitamins. Dietary recalls were collected before chemotherapy treatment, so the effect of chemotherapy and drugs on daily intake is not clear. Moreover, this condition should be considered that patients before chemotherapy have a tendency to consume more foods because most of them had experience of reluctant period of eating in the treatment period. Moreover, with considering these reasons, the amount of milk and vegetable consumption groups in men and women were insufficient and imply the requirement of nutritional interventions. According to these reasons, we recommend a compromising study between dietary recalls in different days and periods to identify the best time for nourishing for patients with cancer to prevent malnutrition. We assessed 300 patients without categorizing them according to the type and degree of disease so they should be considered as study limitations.

Nutritional assessment in patients with cancer is multilateral and should be comprised medical history, dietary recalls, anthropometric, and biochemical assessment. PG-SGA questionnaire considers important and effective nutritional factors and abPG-SGA questionnaire can be the initial step

for nutritional intervention for patients with cancer. Every questionnaire has some limitations, and, in this case, remembering weight in last 6 months and differences of the mental concept of no appetite, dry mouth, and other nutrition complaints are limitations of abPG-SGA questionnaire.

As far as we know, our study is the first one using abPG-SGA questionnaire in outpatient oncology patients in Iran. Although abPG-SGA is a short version of PG-SGA and did not contain physical exam, disease/condition, and metabolic considerations, the prevalence of malnutrition in this study was close to other studies used the full version.[9,12,13,21] Continuous monitoring and use of other tools for nutritional assessment, nutrition counseling, and intervention for these patients are recommended.

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Conflicts of interest
There are no conflicts of interest.

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