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Original Research Article

Nutritional Status of Female Breast Cancer Patients in Benghazi City of Libya

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Abstract: Cancer is reported to be the second and third leading cause of all deaths in both developed and developing countries respectively. In Libya as well cancer is the second leading cause of all deaths. The purpose of this paper is to identify the nutritional status of female breast cancer patients in Benghazi city of Libya via cross-sectional study using Patient Generated Subjective Global Assessment (PG-SGA) was carried out on 145 female cancer patients. Only 1.5 % of the subjects were well nourished. 25% of the studied females were severely malnourished; while 73.5 % were either at risk of malnutrition or suspected to develop malnutrition in the future. The mean age of the subjects' ±SD was 50.8 + 13.5. Living arrangement, income, physical activity levels and body mass index were associated with nutritional status ($P < 0.05$). All sections of the PG-SGA has a significant statistical positive correlation with its total score ($r = 0.54 – 0.93$, $p < 0.05$).It is recommended that public health nutritionists should play a more significant and participatory role in cancer patients health care team. The prevalent malnutrition among breast cancer patients in Benghazi needs a critical intervention from governmental and private sectors. The PG-SGA is a quick, valid highly specific and sensitive nutritional assessment tool that not only allows patients to be identified both the risk as well as actual presence of malnutrition.
Keywords: Nutritional assessment, Malnutrition, Breast, Cancer, Libya.

INTRODUCTION

Cancer is reported to be the second and third leading cause of all deaths in developed and developing countries including Libya [1] The incidence of malnutrition in cancer patients has been found to be as high as 80 % and has been associated with a reduced response to treatment, survival and quality of life [2, 3]. There were around 12.3 million new cases of cancer in the world (5.5 million in economically developed countries and 6.8 million in economically developing countries) in 2007 and these are expected to rise to 27 million new cases in 2050 [4]. In 2003, a study was carried out to collect information from the Benghazi Cancer Registry about new diagnosed cases of cancer from eastern part of Libya revealed a total of 997 new primary cancer cases of the total 1.6 million inhabitants [5]. Worldwide; breast cancer is the most common invasive cancer in women. It comprises 22.9% of invasive cancers in women and 16% of all female cancers. [6] In 2008, breast cancer caused 458,503 deaths worldwide (13.7% of cancer deaths in women and 6.0% of all cancer deaths for men and women atogether). [5] The incidence of breast cancer is lowest in less-developed countries and greatest in the more-developed countries. The number of cases worldwide has significantly increased since the 1970s, a phenomenon partly attributed to the modern lifestyles. In Libya, cancer is second main cause of death (13 %) after cardiovascular disease (37 %). [7].

The SGA and the PG-SGA are the only malnutrition screening tools that are recommended by the ASPEN Board of Directors for a routine clinical use [8]. Also accepted by the Oncology Nutrition Dietetics Practice Group of the American Dietetic Association as the standard for nutritional assessment of cancer patients [9]. It has been used in a variety of health care systems and clinical conditions like surgical patients, kidney disease and renal transplant, HIV patients including oncology patients. [8, 10] Both the Subjective Global

Assessment (SGA) and the Patient Generated Subjective Global Assessment (PG-SGA) [6] allow for early identification of those patients with a nutritional deficit or those who are at risk [9, 11].

Although there is high prevalence of death due to cancer in Libya, there is very limited number of research on cancer in Libya [5]. Moreover, very limited number of research had used (PG-SGA) in Libya as well as in Arabic countries [12]. Nutrition and dietary factors may interact with the process of carcinogenesis in all three stages of initiation, promotion and progression. In fact epidemiological research over the last few decades have highlighted over the contribution of dietary and nutritional factors as well as the preventive role of various phytochemicals present in certain foods in different types of cancer. Patients diagnosed with cancer are at a high risk for malnutrition.

SUBJECTS AND METHODS

A cross-sectional study was carried out from 10th March 2014 to 30th September 2015 on female breast cancer patients in Benghazi city attending three public hospitals in Benghazi city that provide services to female breast cancer patients 145 patients were assessed between 2oth March, 2014 to 30th May, 2014 (Period of data collection) giving a response rate of 85%. Informed consent was obtained from the subjects who were also assured of the confidentiality of the information collected. The research was approved by the administration of the concerned hospitals. Prior to the start of the project the respective hospital administrations were informed in writing about the aim of the study to obtain the maximum possible cooperation to conduct the study.

Questionnaire

The questionnaire was divided into various sub-sections. It included socio-economic information, clinical history, and list of gastrointestinal disorders, anthropometric evaluation, physical activity and current cancer treatment as per the clinical practice guidelines of the Standards [12]. The second section of the questionnaire comprised the PG-SGA as developed by Dr Faith Ottery of the Fox Chase Cancer Center (USA) [13]. The PG-SGA contains questions regarding the presence of nutritional symptoms including those that affect eating habits, disease category and co-morbidities. [14, 15]. The PG-SGA also takes into account each patient's metabolic stress [16]. The scored PG-SGA has four components or boxes which were filled up as explained by Ottery [17].

Measures

Height and weight measurements were used to calculate Body Mass Index (BMI) were the taken in a private area using standard techniques as recommended by the WHO [18]. Weight was measured with a SECA Platform lever scale (Germany) to the nearest 0.25 Kilogram (kg). Height or stature was measured using telescopic height rod attached to the SECA scale and recorded to the nearest 0.5 Centimetre (cm) [19]. In case standard anthropometric measurements for height and weight were not possible because of either difficulty in standing or maintaining an erect posture / being chair bound due to injury or disease and when special measuring equipment such as bed or wheel chair scale is not available, alternative methods of anthropometric measurements were performed [20, 21]. Equations for estimating body weight were used when direct measurement of weight was possible. The decision of which equation to use depended upon the anthropometric measurement that could be obtained [21].

A Gaiam-Pro skin fold calliper (UK) was used to measure the sub scapular skin fold thickness required to estimate the body weight. Upper mid arm circumference (UMAC) and calf circumference (CC) was measured as per standard techniques applicable for the ambulatory and non-ambulatory individuals using a non-stretchable tape and recorded to the nearest 0.1 cm [21].

Similarly the knee height or demi-span method, as an alternative method to estimate the height of non-ambulatory patients was measured as per standard technique [21]. BMI was calculated according to the formula: (weight in kilograms / (height in meter) [22]. BMI for patients with amputations was calculated taking into consideration the addition of the estimated weight missing body part (using the percent body weight contribution by the specific body part) to the current body weight [21]. The WHO cut off ranges were used to define thinness or underweight (< 18.5) and overweight or obesity (> 25) for subjects < 70 years old. Among that > 70 year old, the BMI cut off range to define the various categories based on the U shaped curve with all cause mortality in the elderly were used. In the majority of the elderly the nadir of the curve as recommended by the WHO is 21-27 for men and 23-27 for women [23].

Statistical analysis

The data from the questionnaires was entered using Excel. Data set was exported to SPSS v.18. All data was coded prior to being entered in a computer but the scores for the PG-SGA were entered as a quantitative value. The subjects (*n=145)* means age + SD was 50.8 years + 13.5. Socio-economic and physical activity characteristics are in table 1. Although most of the subjects had some sort of formal education it was mostly as basic level (32.1 %) with fewer percentages with secondary education or its equivalent (21.1 %) or with at least a university degree (22.0 %). More than half the subjects (57.5 %) subsided on monthly family incomes of 250 to less than 500 Libyan Dinars (LD) while about a third (33.5 %) had access to monthly family income of more than 500 LD. A majority (98.0 %) of them lived with family or spouse. Among those who lived alone, a majority (75.0 %) prepared their meals themselves, while 25.0 % employed some sort of domestic help to help in meal preparation. 13.0 % of the subjects were immobile at the time of the study while the remaining were reported to be engaged in varying levels of physical activity: 16.8 % as sedentary, 2.5 % as low active and only 0.5 % were active.

Table 1: Education level, Income level, living arrangement and physical activity

Characteristics	Number	%
Educational level		
Illiterate/RW*	35	24.8
Basic education	47	32.1
Secondary and its level	31	21.1
University degree	32	22.0
Monthly family income (LD)		
< 250	14	9.5
250 < 500	83	57.5
> 500	48	33.5
Living arrangement		
Alone	3	2.0
With others	142	98.0
Physical activity level		
Immobile	19	13.0
Sedentary	121	84.0
Moderate	4	2.5
Low active	1	0.5

Anthropometric characteristic

According to the BMI categorization only 8.0 % of the subjects were underweight while 45.7 % were in the Normal BMI category and 46.7 % were either overweight or obese.

PG-SGA Nutrition Triage Recommendations

Based on the additive score of the PG-SGA 83.5 % of the patients were in critical need for improved symptom management and or nutrient intervention options. 11.5 % of the patients required intervention by a dietician in conjunction with a nurse or physician as indicated by symptom box 3 while 4.5 % of the patients and their families needed nutrition education with pharmacological intervention wherever appropriate. Only 0.5 % of the patients did not currently need any nutritional intervention but it did not rule out a routine and regular reassessment. The Global malnutrition Rating showed that while 25.0 % were severely malnourished another 73.5 % were either at risk of malnourishment or suspected to be malnourishments. Only 1.5 % was well nourished.

Table-2: Distribution of subjects according to BMI categorization

Characteristics	Total	
	Number	%
Underweight	9	8.0
Normal	48	45.7
Overweight or obese	50	46.3

Total (N)	**107**	**100**

Table-3: PG-SGA Nutrition Triage Recommendations

Characteristics	**Total**	
	Number	**%**
No intervention needed	1	0.5
Patient and family intervention	7	4.5
Medical team intervention	17	11.5
Critical intervention	120	83.5
Total (N)	145	100

Table-4: Nutritional status of all the subjects based on the Global Assessment Categories

Characteristics	**Total**	
	Number	**%**
Well nourished	3	1.5
Moderately malnourished	107	73.5
Severely malnourished	35	25.0
Total (N)	**145**	**100**

STATISTICAL TESTS

A Chi Square test was carried out to see if there was any statistically significant association between the nutritional status of the subjects, with various socio-economic, physical activity, medical and dietary factors. Income level was the only socio-economic factors associated ($p< 0.05$) with the nutritional status of the subjects. A lower income level was associated ($p< 0.05$) with poorer nutritional status. There was a shift of patients from the risk of malnourishment or suspected malnourishment to severe malnourishment as the income level dropped.

Table-5: Association of income level, physical activity, living arrangement with the nutritional status of the subjects

	Percentage of subjects		
Income level (LD)	**Well nourished**	**Risk of malnourishment**	**Severely malnourished**
< 250	0	47.4	52.6
250-500	2.6	69.3	28.1
> 500	0	88.1	11.9
Physical Activity			
Immobile	0	42.3	57.7
Sedentary	1.8	78.0	20.2
Low Active	0	80.0	20.0
Active	0	100	0
Living Arrangement			
Alone	0	45	55
With others	67	23	10
Living alone: food preparation methods:			
Self	11	43	46
Domestic Help	18	20	62
Convenience foods	19	31	50

Analysis of variance

Analysis of variance by ANOVA showed that in terms of the mean total PG-SGA score, the normal (2.33 + 0.58), at risk of malnutrition or suspected malnutrition (16.39 + 8.69) and the severely

malnourished group (25.40 + 7.16) differed (p< 0.05) from each other. The three groups of subjects categorised according to their nutritional status assessed by the PG-SGA also differed in their mean score for the history and physical assessment component.

Table-6: Comparison of mean PG-SGA score among the subjects according to their nutritional status

Components of PG-SGA	Mean (+ SD) scores of subjects		
	Normal	Risk of malnutrition or suspected malnourishment	Severely malnourished
History	1.33* (+ 0.58)	12.10* (+ 6.54)	20.30* (+ 4.75)
Co-morbid condition	1.0 (+ 0)	1.49 (+ 0.67)	1.68 (+ 0.74)
Metabolic stress	0 (+ 0)	2.52 (+ 2.51)	2.60 (+ 3.11)
Physical examination	0* (+ 0)	0.29* (+ 0.56)	0.82* (+ 0.83)
Total of all components	2.33* (+ 0.58)	16.39* (+ 8.69)	25.40* (+ 7.16)

* ANOVA: At $p < 0.05$

Correlation of individual components within the PG-SGA with the total PG-SGA score

All the four components as well as four subsections of the history component questions within the four domains of the PG-SGA had a highly statistically significant (p = 0.000) positive correlation (r = 0.51-0.96) with the additive PG-SGA score.

Table-7: Correlation of PG-SGA questions in the anthropometry assessment domain to total MNA score

MNA subsection		Correlation Coefficient (r)
Box	Component	
1	Weight	0.64*
2	Food intake	0.68*
3	Symptoms	0.91*
4	Functional capability	0.62*
A (1-4)	History	0.96*
B	Co-morbid condition	0.58*
C	Metabolic stress	0.60*
D	Physical examination	0.51*

* Pearson's correlation at $p < 0.05$

DISCUSSION

The incidence of malnutrition in breast cancer female patients has been found to be high [11] and it has been found that presence of an oncology disease was associated with greater malnutrition among patients. It has been shown elsewhere too that among hospitalized inpatients in general, cancer patients have the highest rates of malnutrition [24, 25]. A study on breast cancer patients showed that malnutrition at the initiation of the therapy as assessed by the SGA was 31 % but jumped to 43 % at the end of the therapy. [25] Unless aggressive nutritional support is initiated early, cancer and its treatment can have profound and devastating effects on nutritional status, often resulting in cachexia and death [24]. The present study carried out to assess the nutritional status of the breast cancer female patients in Benghazi city, 25.0 % were severely malnourished another 73.5 % were either at risk of malnourishment or suspected to be malnourishments. Only 1.5 % of the subjects were well nourished.

Studies exclusively on breast cancer patients where SGA [16] and PG-SGA [11,12,13,26,27,28] have been used to assess nutritional status have reported malnourishment to vary from 6.0 % to as high as 80 % [11-13, 16, 26, 27], It is been said that the prevalence of malnutrition varies depending upon the setting as well as the assessment techniques [17]. In these previous studies even though the same nutritional assessment tool was used [11-13, 16, 26, 27, 29], it could be argued that the different subject setting was responsible for this wide disparity in malnutrition prevalence rates among cancer patients. Based on the additive score of the PG-SGA and the cut off values of the Nutrition Triage Recommendation to define the type of intervention, 83.5 % of the patients were in critical need for

improved symptom management and or nutrient intervention options.

The figure of 83.5 % of subjects in this study requiring critical nutritional intervention is much higher than a recent study where 42.4 % cancer patients undergoing chemotherapy of the patients were in critical need of nutritional intervention as per the same PG-SGA triage recommendation [29]. However if the intervention needs of all degrees were clubbed together as many as 97.6 % of cancer patients were identified as in need of some sort of nutritional intervention [26] not much different from 99.5 % in this study. Nutritional intervention needs to be tailor made as per the specific need of the patient [1, 3, 10, 23] because a "typical" cancer patient does not exist [1]. This agrees with the statement that there is a need for nutrition intervention to be supportive, adjunctive or definitive depending upon the patient [1, 3, 10]. This also reemphasizes of the advantages of using a nutritional screening tool like the scored PG-SGA because it allows prioritization of patients requiring more urgent treatment and may thus facilitate more effective use of resources [13].

Early education of the patient on the role of nutrition is essential to promote adequate nutritional intake. Cancer patients should be made to understand that nutrition is an integral part of the total management of their disease [10] and nutrition education should be an essential component of every treatment plan for cancer patients [6]. The small 0.5 % of the patients in this study, who did not currently need any nutritional intervention, was however still required to undergo routine and regular reassessment during the course of the treatment. The chronic nature of nutritional problems related to cancer shows that nursing care often continues after the patient leaves the hospital setting and returns home [6]. This hold true because dietary intervention must not only be individualized but also be continuously evaluated and revised according to the patient's needs and the ability to eat [1]. Income level, living arrangements were the only socio-economic factors associated ($p< 0.05$) with the nutritional status of the subjects in this study.

It showed a worsening of nutritional status with lowering of income level. Literature review and critical appraisal by a multidisciplinary group of experts, with feedback from specialists in cancer care delivery stresses on the need for social and economic data to be collected as a part of clinical practice guidelines to improve the quality of health care and outcome for cancer patients [24]. The prevalence of malnutrition also appears to be dependent upon the healthcare system and the economic situation of the country where the study was performed [21, 22]. Regarding living arrangement; it is widely acknowledged that living arrangements are important determinants of well-being among cancer patients [22] However, the majority of previous studies on such transitions have targeted living alone populations (particularly women), mainly because variability and change are more extensive in these population subgroups. Many of the studies on the determinants of transitions in living arrangements have analysed very broad age groups, often focusing on the combined population of all persons older than age 45. These analyses show that transitions are rare events. However, this kind of generalization is likely to best apply to those breast cancer women younger than the age of 40 or 45, a period of life before the onset of severe disability, illness, or institutionalization. Given the fact that these events are strongly gendered, living arrangement transitions will also be very different for men and women.

Furthermore, malnutrition was the most common transition in all groups of living alone breast cancer women [22, 31]. The quantum of these transitions is difficult to compare across countries because of large differences in data sources. However, if one takes these methodological differences into account, the evidence indicates that the stability in living arrangements have been associated with stable and improved in nutritional status. In addition to family care, the provision of and access to private home-based services may also go some way in explaining well nutritional status among cancer patients. Cancer patients living in countries with comprehensive home-based services may be able to maintain independent living longer than those residing in other countries [22]. Activity level was associated ($p< 0.05$) with the nutritional status of the subjects. The immobile were at the greater risk of malnourishment and of being malnourished and had the least percent of a normal nutritional status as compared to those who were active to any degree. Immobility adversely affects the quality of life, threatens independent living and personal autonomy and increases both formal and informal care needs. It also has adverse effects on physical health since inactivity increases the risk of many diseases like diabetes mellitus, cardiovascular disease and osteoporosis [30].

BMI was associated ($p < 0.05$) with the nutritional status of the subjects. Since fluid retention can mask weight status [32], subjects with oedema were excluded when the statistical analysis was done.The

subjects classified as underweight according to their BMI had the least percentage of having a normal nutritional status. However even the both the normal as well as the overweight and obese group had had a substantial degree of malnourishment. Studies indicate that BMI alone is not an accurate indicator of nutritional status among cancer patients [38]. Malnourished cancer patients may have a normal BMI [13, 44] inspite of having lost as much as 10-20 % weight in the previous six months [44] or be overweight range because of body fat masking loss of lean body tissue [13].

Weight gain and obesity are common in breast cancer patients and there is some evidence that cancer recurrence rate may be adversely affected by the patient being overweight. Therefore, in such cases obesity must be treated with gradual intentional weight loss through moderate energy control and if appropriate, exercise [10]. Involuntary weight loss is an ominous sign and should however be investigated [33-35]. The well nourished, at risk of malnourishment or suspected malnourished and the severely malnourished groups differed ($p< 0.05$) from each other in their mean PG-SGA score as well two of its components. This implies that an accurate and comprehensive nutritional assessment to suggest appropriate interventional strategy among cancer patients should include the detailed and diverse information like weight loss, food intake, symptoms and functional capability as well as physical measurements. This finding further justifies the use of PG-SGA in this study.

Severe weight loss is associated with increase in mortality and morbidity. Severe weight loss apart from being fatal is also used as one of the various guidelines for the timely initiation of parenteral nutrition [**1]**. Food intake and symptoms such as nausea and vomiting need to be closely monitored [23] and need to include better treatment of these symptoms [26]. Pain is known factor in decreasing appetite [9]. Cancer patients are more able to eat if severe pain is controlled and they are positioned as comfortable as possible. In fact current medical consensus allows administering as much pain control medicine as needed, in close consultation with the family and patient [3].

Living with a diagnosis of cancer may have serious emotional consequences, some of which may be associated with change in eating habits. Depression following the diagnosis of cancer often contributes to anorexia [36]. Provision of emotional support to such patients can help improve food intake [1]. The appropriateness of using laboratory measurements for nutritional impact evaluation will depend on the nature of the intervention programme and the kind, severity, and prevalence of nutritional problems. Laboratory measurements are most appropriately applied in tandem with the introduction of specific, population-based nutrient interventions, such as iron, iodine, or vitamin A food fortification programs, or in interventions targeted to individuals who are given specific supplements for which specific before-and after-treatment effects can be measured. In the current study, the researchers have not aimed to any application of any intervention to treat and/ or mange the cancer in the selected population. The research has aimed only to assess the current situation [51].

Biochemical methods may not be useful in evaluating general food aid programmes for adult with only marginally adequate diets such as cancer patients. Under these circumstances, limitations in the magnitude of biochemical responsiveness to moderate dietary change that can be reliably detected by laboratory measurements could preclude usefulness. Furthermore, it is unlikely that significant alterations in biochemical status would be detected by laboratory methodology in this short period of data collection [21, 32].

CONCLUSION

The mean prevalence of severe malnutrition was 25.0 % among breast cancer female patients in Benghazi city while that of those at risk of malnourishment or suspected to be malnourished was 73.5 %. According to the Nutrition Triage Recommendation, only 1.5 % of the patients did not currently need any nutritional intervention. A lower income level and immobility were associated with lower nutritional status. Categorisation of nutritional status according to BMI although associated with the nutritional status of the subjects highlighted its insensitivity as the sole means of assessment of nutritional status of cancer elderly. Rather than BMI, physical assessment and a recent weight loss was found to be a more sensitive indicator of poor nutritional status. Study subjects differing from each other in the history and physical assessment components of the PG-SGA, justifying its use for the accurate and comprehensive nutritional assessment to suggest appropriate interventional strategy among cancer patients.

All the four components as well as four subsections of the history component questions of the PG-SGA were highly correlated with the additive PG-SGA score and pinpoint those factors that may adversely affect nutritional status.

The results of this study are intended to help the government identify the subgroups within cancer patients receiving radiotherapy and/or chemotherapy in Benghazi city who are at greater nutritional risk, who may benefit from early intervention and to guide it towards optimal, timely and cost effective nutritional intervention.

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