

**Original Research Article****Nutritional Status of Lung Cancer Patients in Benghazi City of Libya****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 lung cancer patients in Benghazi city of Libya via cross-sectional study using Patient Generated Subjective Global Assessment (PG-SGA). The study was carried out on 121 lung cancer patients. Out of 121 lung cancer patients; Only 7.5 % of the subjects were well nourished. 22% of were severely malnourished; while 70.5 % were either at risk of malnutrition or suspected to develop malnutrition in the future. The mean age of the subjects'  $\pm$ SD was  $49.5 \pm 0.6$ . Age, family income, and physical activity levels were associated with nutritional status of the subjects at ( $P < 0.05$ ). All sections of the PG-SGA has a significant statistical positive correlation with its total score ( $r = 0.96 - 0.51$ ,  $P < 0.05$ ). Dietitians played a very limited role in patients' nutritional care.

**Key Words: Lung, Cancer, Nutritional, Status, Assessment, Malnutrition**

**1. INTRODUCTION**

Lung cancer, is a malignant lung tumour characterized by uncontrolled cell growth in tissues of the lung. Most cancers that start in the lung, known as primary lung cancers, are carcinomas. The two main types are small-cell lung carcinoma (SCLC) and non-small-cell lung carcinoma (NSCLC) [1-4]. Nearly 40% of lung cancers are adenocarcinoma, which usually originates in peripheral lung tissue. The lung is a common place for the spread of tumors from other parts of the body [5-6]. Lung cancer staging is an assessment of the degree of spread of the cancer from its original source. It is one of the factors affecting the prognosis and potential treatment of lung cancer [5].

The interplay between diet, environment and genetic predisposition is important in many diseases including cancer. Nutrition and dietary factors may interact with the process of carcinogenesis in all three stages of initiation, promotion and progression [8-9]. 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 [6].

Patients diagnosed with cancer are at a high risk for malnutrition. This malnutrition can result from cancer itself but it is further complicated by the treatment of the disease. Ample evidence indicates that vigorous

nutritional support increases the chances for successful medical treatment in the care of cancer [7]. Physical impairment because of the site of the tumour or the extent of the tumour involvement, metabolic changes and the risk of developing antineoplastic therapy all place a cancer patient at an increased risk of developing malnutrition. Benefits of nutritional adequacy help maintain nutritional status among cancer patients by not just ensuring that these patients meet their increased energy and protein requirements but also by decreasing the risk of complications, reducing complication and promoting an increased tolerance due to oncology therapy [8]. Subjective Global Assessment (SGA) and the Patient Generated -Subjective Global Assessment (PG-SGA) are the only malnutrition screening tools that are recommended by the ASPEN Board of Directors for a routine clinical use [9]. 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 [9,10]. The aim of this paper to assess the nutritional status of the lung cancer patients using the PG-SGA into one of three possible categories of either well nourished, moderately nourished/ suspected malnourished or severely malnourished.

**2. MATERIALS AND METHODS****2.1 Study Population and Design**

It is a cross-sectional study carried out from 21<sup>st</sup> August 2016 to 30<sup>th</sup> June 2017 on 121 lung cancer patients in Benghazi city (giving a response rate of 91.6 %). The inclusion criterion for enrolment in the present study was all oncology lung cancer patients who had a body

weight record for the previous two weeks and one month. According to the Ministry of Health listing there are only Two public hospitals in Benghazi city that provide services to lung cancer patients: Benghazi Medical centre and Al-kweafia hospital three days

weekly on Sunday, Tuesday and Thursday. Based on this criterion a total of 121 patients were assessed between 17<sup>th</sup> September 2016 to 30<sup>th</sup> March 2017 (Period of data collection) were randomly approached

## 2.2 Ethics

Informed consent was obtained from the subjects who were also assured of the confidentiality of the information collected. The research was approved by the ethical board of Faculty of Public Health, University of Benghazi and the administration of the concerned

## 2.3 Methodology

Data was collected with a structured questionnaire. Patients were approached at the respective hospitals, and briefed about the purpose of the study before questionnaire was administered. The questionnaires were reviewed for missing portion or ambiguity. Incomplete or unclear questionnaires were excluded from the study. The first section covered various socio-economic characteristics like gender and age, marital status, nationality, education and profession, type of housing, living condition (alone or with others) and number of family members in the household for those not living alone, food preparation methods for those who living alone, monthly personal or family income of the subject as the case may be, information about self reported activity level, immobility and exercise. Physical activity levels were defined based on the contribution of the type, amount and frequency of the

## 2.4 Anthropometry

Height and weight measurements used to calculate BMI were taken in a private area using standard techniques as recommended by the World Health Organisation WHO. Weight was measured with a SECA Platform lever scale (Germany) to the nearest 0.25 Kilogram

## 2.5 Statistical Analysis

All data was coded prior to being entered in a computer. Description and analysis of data was carried by SPSS

## 3. Results

A sample of 121, included 100 males (82.16%) and 21 females representing (17.4) % of the total sample with The mean age  $\pm$ SD was (49.5 $\pm$ 0.6); (50  $\pm$  2.3 and 49  $\pm$  1.9 for male and female respectively). Subjects were predominantly between the ages 40-59 years old (60.40 %). A majority of the subjects were married (95 %). Although most of the subjects had some sort of formal education it was mostly as basic level (41.3 %). More than half the subjects (70 %) subsided on monthly family incomes of 250 to less than 500 Libyan Dinars (LD). Table 1 and 2 show demographic characteristics. 13.0 % of the subjects were immobile at the time of the

to participate in the study. Out of the 132 patients, 4 refused to participate in the study and 7 subjects were excluded from the study because they were unable to answer all the questions required for the study.

hospitals. Prior to the start of the project the respective hospitals administration were informed in writing about the aim of the study to obtain the maximum cooperation from the named hospitals.

self reported activities of the subjects. Detailed information was collected regarding the lung cancer classification, duration of cancer, type of cancer therapy and its duration, special oncology diet and who is prescribed by and its compliance. It also contained sub-sections for collecting medical information related to chronic diseases and surgery. The next part of the questionnaire had a section for obtaining information pertaining to nutritional intake like use of enteral and parenteral nutrition, self perceived food allergies, food aversions and nutritional supplement. The PG-SGA contains questions regarding the presence of nutritional symptoms including those that affect eating habits, disease category and co-morbidities. The PG-SGA also takes into account each patient's metabolic stress [11, 12].

(kg). Height or stature was measured using telescopic height rod attached to the SECA scale and recorded to the nearest 0.5 Centimetre (cm). BMI was calculated according to the formula: (weight in kilograms / (height in meter<sup>2</sup>) [13].

version 18. Level of significance was set at p value < 0.05.

study while the remaining were reported to be engaged in varying levels of physical activity. 82 % of the subjects were sedentary as shown in table 3. Based on its histological classifications, more than half of the subjects had SCLC (55.4 %) The mean duration of cancer was 13.2 months ( $\pm$  15.6 S.D) and 54.5 % of the patients were those who had been diagnosed with cancer within the past 12 months. More than half 57% of the subjects were undergoing chemotherapy alone while radiotherapy was being followed by 34 % of the patients. The mean duration of the therapy was 6.9 months ( $\pm$  10.2). Most of the Subjects (66 %) had not

been prescribed any special oncology diet as shown in table 4. More than half the subjects (78 %) had at least one chronic disease. Of the total subjects, 36.0 % had not undergone surgery of any kind. 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 as shown in table 5. 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; while 11.5 % of the patients required intervention by a dietician in conjunction with

a nurse or physician as shown in table 6. The Global malnutrition Rating showed that while 22.3 % were severely malnourished another 70.2 % were either at risk of malnourishment or suspected to be malnourishments. Only 7.4% were well nourished as shown in table 6. Age and income level were the only socio-economic factors associated ( $p < 0.05$ ) with the nutritional status of the subjects. An increase in age years was associated ( $p < 0.05$ ) with poorer nutritional status. A lower income level was associated ( $p < 0.05$ ) with poorer nutritional status.

**Table (1) Subject characteristics**

Age (Years)	Total	
	Male	Female
<b>20-39</b>	19(15.7)	0(0)
<b>40-59</b>	55(45.5)	18(14.9)
<b>60-79</b>	26(21.5)	3(2.5)

**Table (2) Demographic characteristics of subjects**

Characteristics	Subject	
	Number	%
<b>Nationality</b>		
Libyan	118	97.5
Others	3	2.5
<b>Marital status</b>		
Unmarried	5	4
Married	95	78.5
Widow/widower	12	10
Divorcee	9	7.5
<b>Educational level</b>		
Illiterate/RW*	35	29
Basic education	50	41.3
Secondary and its level	15	12.4
University degree	21	17.3
<b>Occupation</b>		
Employed	83	68.5
Unemployed	24	20
Retired	14	11.5
<b>Monthly family income (LD)</b>		
< 250	15	12.4
250 < 500	85	70
≥ 500	6	17.6
<b>Type of housing</b>		
Flat	30	25
Independent house	75	62
Villa	15	12
Farm house	6	5
<b>Living arrangement</b>		
Alone	7	6.0
With others	114	94.0

<b>Living alone: food preparation methods</b>		
Self	5	71.0
Domestic help	2	29.0
Convenience foods	0	0
<b>Number of family member for those not living alone</b>		
< 5	22	19
5 < 10	64	56
> 10	28	25

**Table (3) Self reported physical activity characteristics among subjects**

Characteristics	Total	
	Number	%
<b>Physical activity level</b>		
Immobile	16	13.0
Sedentary	100	82.0
Moderate	4	3.3
Low active	1	0.83
<b>Exercise done</b>		
Yes	6	5.0
No	115	95.0
<b>Exercise: Duration (min)</b>		
< 30	3	62.5
30 < 60	1	12.5
≥ 60	2	25.0
<b>Exercise: Frequency per week</b>		
1-3	6	75.0
4-6	1	12.5
Daily	1	12.5
<b>Type of exercise</b>		
Walking	4	<b>75.0</b>
Others	2	<b>25.0</b>

**Table (4) Medical characteristics of subjects**

Characteristics	Total	
	Number	%
<b>Cancer type: Histological classification</b>		
(SCLC)	67	55.4
(NSCLC).	54	44.6
<b>Cancer duration (months)</b>		
< 6	43	35.5
6 < 12	23	19
12 < 24	30	24.7
≥ 24	25	20.7
<b>Type of cancer therapy</b>		
CT *	69	
RT **	41	
Both	11	

<b>Duration of therapy (months)</b>	
< 6	42
6 < 12	36
12 < 24	35
≥ 24	8
<b>Cancer diet</b>	
Yes	41
No	80
<b>Chronic disease</b>	
Yes	94
No	27
<b>Surgery</b>	
Yes	53
No	68
Type of surgery	
GIT *	22
Others	31

**Table (5) Distribution of subjects according to BMI categorization**

Characteristics	Total	
	Number	%
<b>Underweight</b>	10	8.0
<b>Normal</b>	55	45.7
<b>Overweight or obese</b>	56	46.3

**Table (6) Distribution of the subjects based on Nutrition Triage Recommendation**

Characteristics	Total	
	Number	%
No intervention needed	1	0.5
Patient and family intervention	5	4.5
Medical team intervention	14	11.5
Critical intervention	101	83.5
Well nourished	9	7.4
Moderately malnourished or suspected malnourished	85	70.2
Severely malnourished	27	22.3

**Table (7) Variables Associated with the nutritional status of the subjects**

Variables	Percentage of subjects		
<b>Age</b>			
20-39	59.6	35.3	5.1
40-59	33.3	48.9	17.8
60-79	30.0	50.0	20.0
<b>Income level</b>			
< 250	0	47.4	52.6
250 < 500	2.6	69.3	28.1
≥ 500	0	88.1	11.9
<b>Activity level</b>			
Immobile	0	42.3	57.7
Sedentary	1.8	78.0	20.2
Low Active	0	80.0	20.0
Active	0	100	0

## Discussion

The incidence of malnutrition in lung cancer patients has been found to be high and it has been found that presence of an oncology disease was associated with greater malnutrition among patients [14,15]. It has been shown elsewhere too that among hospitalized inpatients in general, cancer patients have the highest rates of malnutrition [16, 17].

A study on lung 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. 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 [18]

The present study carried out to assess the nutritional status of the lung cancer patients in Benghazi city, 22.3 % were severely malnourished another 70.2 % were either at risk of malnourishment or suspected to be malnourishments. Only 7.4 % of the subjects were well nourished.

Studies exclusively on lung cancer patients where SGA and PG-SGA have been used to assess nutritional status have reported malnourishment to vary from 6.0 % to as high as 80 %. It is been said that the prevalence of malnutrition varies depending upon the setting as well as the assessment techniques<sup>17</sup>. In these previous studies even though the same nutritional assessment tool was used, it could be argued that the different subject setting was responsible for this wide disparity in malnutrition prevalence rates among cancer patients [18-21].

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. [22] 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 not much different from 99.5 % in this study [23]. Nutritional intervention needs to be tailor made as per the specific need of the patient because a “typical” cancer patient does not exist [24-26]. This agrees with the statement that there is a need for nutrition intervention to be supportive, adjunctive or definitive depending upon the patient. 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 resource. Early education of the patient on the role of nutrition is essential to promote adequate nutritional intake [13, 27-29].

The small 0.5 % of the patients in this study, who did not currently need any nutritional intervention, were 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. This hold true because dietary intervention must not only be individualized but also be continuously evaluated and revised accordingly according to the patient’s needs and the ability to eat [1,6].

In this study age group was inversely associated ( $p < 0.05$ ) with better nutritional status. As the age group increased there was a lowering in the nutritional status. The study of nutritional needs of the cancer patients is complicated by the fact that the older the person, the more complex their nutritional needs from both a social and physiological point of view [30]. Ageing is generally associated with a decline in various physiological functions and possibly leading to malnutrition [31]. Increasing age has also been linked with a higher incidence for disease and disability; both of which reduce food intake and appetite of lung cancer patients [32, 33]. This age related occurrence and chronicity of medical illnesses associated with impaired nutritional status also bring with it the need for prescription medicine adding to the risk of malnutrition through their various adverse effects. Increasing age also brings with it economic deprivation as earnings decrease, if not cease all together. The lower the income, the less likely an adequate and varied diet will be used [15,18, 34].

Income level was 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<sup>24</sup>. 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 [35.36].

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 [37].

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. 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.

Food intake and symptoms such as nausea and vomiting need to be closely monitored and need to include better treatment of these symptoms [7, 38, 39]

Pain is known factor in decreasing appetite. 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, 6].

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. Provision of emotional support to such patients can help improve food intake [1, 30].

### Competing interests

Authors have declared that no competing interests exist.

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 manage the cancer in the selected population. The research has aimed only to assess the current situation. 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.

[40, 41]

### Conclusion

The present study carried out to assess the nutritional status of the lung cancer patients in Benghazi city, 22.3 % were severely malnourished another 70.2 % were either at risk of malnourishment or suspected to be malnourishments. Only 7.4 % of the subjects were well nourished. All lung cancer patients in Benghazi should be routinely screened for malnutrition or its risk using the PG-SGA. Early nutritional intervention strategies including nutrition education, involving a multidisciplinary team of clinicians, dieticians and nursing staff should be implemented with an appropriate follow up. Additional studies need to be carried out among cancer patients in different settings as well as other regions of Libya to identify the specific prevalence of malnutrition and factors associated with it.

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