Assessment of the Nutritional Status of Cancer Patients in Qena Governorate

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Abstract:

Background: Cancer has become one of the most common debilitating systemic diseases, and it's responsible for a large number of worldwide deaths annually, In cancer patients, QoL is affected by the specific diagnosis, its meaning for the patient, the disease's , impact on the patient's physical and mental condition, short- and long-term adverse effects of treatment, the patient's coping mechanisms, and the reactions of their family members or other individuals .**Objectives:** The main objective of this prospective study is to assess the nutritional state of cancer patients and correlate nutritional state with response and tolerability to the treatment line along with the survival of the patients and help to increase awareness to clinical application of nutritional therapy with oncological therapy.

Patients and Methods: 300 cancer patient,(Age> 18 years - <70 years); 30% of patients presented with breast cancer , 16% of patients with colon cancer, 15% of patients with pancreatic cancer ,12 % of patients with NHL ,1% of patients with glioma.

Results: the mean cumulative proportion of event-free patients for the study group was at 0.95 (SE,0.01) at 1 month, 0.88 (SE, 0.02) at 3 months, and 0.75 (SE, 0.03) at 6 months.

Conclusion: Assessment of nutritional status in cancer patients is more accessible and designed through the application of MUST scoring system on patients at the time of first presentation and along the treatment course. It allows signing down all symptoms and changes occur, classification of the patients' conditions and design a treatment protocol according to severity.

Keywords: Cancer; Nutrition ; Cancer patient ;Survival.

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Introduction

The nutrition status of patients with cancer can vary at presentation and through the continuum of cancer care. Many patients experience unintentional weight loss leading to a diagnosis of cancer. Diet and nutrition are important factors in the promotion and maintenance of good health throughout the entire life course Diet has been known for many years to play a key role as a risk factor for chronic disease **(Polański et al. 2017)**

Nutrition plays a pivotal role in life and in medicine. Acute and chronic diseases in most organ systems have pronounced effects on food intake and metabolism with increased catabolism, which lead to nutrition – related conditions associated with increased morbidity and eventually death. At the other end of spectrum, diet is a major determinant of future health, i.e. the absence or postponement of disorders like cardio-vascular disease, diabetes, cancer and cognitive disease **(Jackson et al. 2006)** Clinical nutrition is the discipline that deals with the prevention, diagnosis, and management of nutritional and metabolic changes related to acute and chronic diseases and condition caused by a lack or excess of energy and nutrients **(Singer et al. 2019)**

Cancer has an increasingly significant impact on society, being a highly destabilizing factor in the life of any patient. The disease as well as anti-neoplastic treatments can profoundly alter biological functions and, remarkably, the patients' nutritional status. Thus, Nutrition is a key factor in oncology, by influencing the development of the disease, cancer related symptoms, the response to, and recovery from treatment(s), and therefore determining the patients' Quality of Life and probably prognosis. Therefore, the assessment of Quality of Life in any clinical study is essential because it values physical, psychological and social factors, which often depend on or are related with Nutrition.

Patients and methods

A prospective study was conducted to evaluate malnutrition among cancer patients using (Malnutrition Universal Screening Tool) MUST. The purpose of using a screening tool is to identify patients at risk of malnutrition and to select those individuals, who are in need of further evaluation and potential intervention. The study was approved by the Research Ethics Committee of our institution, under approval code (SVU-MED-ONM027-1-21-9-236).

The main objective of this prospective study is to assess the nutritional state of cancer patients and correlate nutritional state with response and tolerability to the treatment line along with the survival of the patients and help to increase awareness to clinical application of nutritional therapy with oncological therapy.

We consecutively assess patients presenting to the outpatient clinic of our hospital .patients underwent several tests needed for the early identification of malnutrition during hospital stay or outpatient visits **(Stratton et al. 2004)**

MUST uses :

1-Current body mass index (BMI)

2-Unintentional weight loss

3-The presence of any acute disease effect that could compromise nutritional intake for >5 days.

It includes three parameters rating them 0, 1 or 2 as follows :

BMI:

- BMI >20 kg\m2 =0
- BMI 18.5-20 kg \m2 =1
- BMI <18.5 kg\m2 = 2

Unintentional weight loss :

-Unintentional weight loss in the past 3- 6 months <5% =0

- Unintentional weight loss in the past 3-6 months 5-10 % =1

- Unintentional weight loss in the past 3-6 months >10% = 2

Acute diseases:

-absent = 0
-present = 2
The overall risk of malnutrition is established after addition of all points allocated, as follows :

- 0=Low risk
- 1= Medium risk0
- 2= High risk **(Chao et al. 2015)**

We carried out great attention to the influence of nutrition and immune status on patients' prognosis of cancer: *The prognostic nutrition index (PNI) is a simple and effective parameter, initially created to evaluate preoperative nutritional conditions and surgical risk. It has been recently been found to be associated with short- and long-term outcomes of various malignancies**(Sun K et al. 2015)**

PNI is calculated based on the serum albumin concentration and peripheral blood lymphocyte count and is an indicator of the nutritional and immune status of cancer patients. The PNI is calculated as 10 × serum albumin (g/dl) + 0.005 × total lymphocyte count (per mm3).
*The nutrition risk index is an index based on ideal body weight that aims to present body weight and serum albumin levels, it seems to account for both acute and chronic reasons of nutrition-related complications**.(Cereda et al.2009)**

Nutrition risk index is calculated as follows: NRI = (1.519 × serum albumin (g/L) +41.7× (present weight/usual weight). The patients with NRI score of >100 was considered in no risk group, 97.5–100 mild risk, 83.5–97.5 moderate risk, and < 83.5 has severe risk groups **(Ikeya et al. 2015)**

The patients were classified according to
1-Personal data ,including : age, gender, residence, smoking &associated comorbidities.
2-Tumor characteristics ,including: site of the tumor ,cancer stage, TNM classification& metastatic or not
3- Treatment options , including : systemic treatment (chemotherapy)
Or, local treatment (radiotherapy or surgery)
4- Nutritional data, including: BMI, NRI&PNI

All patients were assessed for their medical history (weight changes, gastrointestinal symptoms, and changes in functional capacity) and physical examination (loss of subcutaneous fat, muscle wasting, ankle or sacral edema and ascites)

Patients' weights at first presentation to the clinic were signed down then follow up done throughout the treatment course monitoring mainly the weight changes, as it is the most liable factor to be affected shortly.

Patients were assessed every 3 months. So, overall assessment of patients is :at presentation,3 months &6 months
Follow up was run along 3 months since the treatment initiation.
During every single visit, for each patient, new symptoms were asked about, documented and assessed for whether the patient generally improved or not.

The overall risk of malnutrition at first presentation **(Stratton et al. 2004)** is established after addition of all points allocated, as follows :

- 0=Low risk
- 1= Medium risk
- 2= High risk

Statistical analysis
Qualitative data were expressed as frequency and percentage.
Quantitative data were initially tested for normality using Shapiro-Wilk's test with data being normally distributed if p>0.050. Presence of significant outliers (extreme values) was tested for by inspecting boxplots. Quantitative data were expressed as mean ± standard deviation (SD) if normally distributed or median and interquartile range (IQR) if not.

Data comparison: Qualitative data: Fisher's exact test was used based on expected count per cell. Quantitative data for two groups: Mann-Whitney U test was used for non-normally distributed data in

one or both groups and / or presence of significant outliers.Quantitative data for three groups: Kruskal-Wallis H test was used for non-normally distributed data and / or presence of significant outliers.

Results

Demographic data of the enrolled patients including age, gender, residence, smoking status, and associated comorbidities, are summarized in (**Table.1).**

Table 1. Patient Characteristics (N = 300)

Variable	**Value**
Age (years)	
Mean ± SD	42.5 ± 7.8
Range	18 – 60
Gender	
Male	160 (53.3%)
Female	140 (46.7%)
Residence	
Urban	175 (58.3%)
Rural	125 (41.7%)
Smoking Status	
Nonsmoking	210 (70%)
Smoking	90 (30%)
Associated Comorbidities	
None	166 (55.3%)
Hypertension	73 (24.3%)
Diabetes Miletus	63 (21%)
Coronary Artery Disease	37 (12.3%)
Chronic Obstructive Lung Disease	32 (10.7%)
Stage of Disease	
Stage I	45 (15%)
Stage II	114 (38%)
Stage III	105 (35%)
Stage IV	36 (12%)

Tumor characteristics

(**Table.2**) six different locations of malignancy were identified in our study group, including breast, upper GIT (stomach, oesophagus, pancreas, gall bladder), lower GIT (colon, rectum), urogenital (ovary, endometrium, urinary bladder), bone marrow (NHL), and central nervous system (glioma). The most common site of cancer was the breast representing 35%, followed by colon cancer (15%), gastric cancer (12%), and esophageal cancer (10%). The least commonly encountered cancers were NHL (2%), gall bladder cancer (1%), and glioma (1%).

Table 2. Distribution According to the Site of Cancer (N = 300)

Variable	Frequency	Percentage
Breast Cancer	105	35
Upper GIT	81	27
Gastric Cancer	36	12
Esophageal Cancer	30	10
Pancreatic Cancer	12	4
Gall Bladder Cancer	3	1
Lower GIT	69	23
Colon Cancer	45	15
Rectal Cancer	24	8
Urogenital Cancer	30	10
Ovarian Carcinoma	12	4
Endometrial Carcinoma	12	4
Urinary Bladder Cancer	12	4
Haematological		
Non-Hodgkin Lymphoma	6	2
Neurological		
Glioma	3	1

Nutritional Status

Nutritional status was assessed using nutrition risk index (NRI), prognostic nutrition index (PNI), and body mass index (BMI) pre-treatment and post-treatment at 1, 3, and 6 months. As demonstrated in **(Table.3)**, a statistically significant decline was found in NRI, PNI, and BMI at last follow-up (Repeated measure ANOVA, $P < .05$)

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Table 3. Comparison of Nutritional Status between Pre-treatment and Post-treatment (N = 300)

	Minimum	Maximum	Mean	SD	*P* value
NRI					.003
Pre-treatment	90	100	94.9	3.1	
1 month	88	100	93.8	3.3	
3 months	75	96	80.8	3.4	
6 months	65	80	72.2	3.5	
PNI					.006
Pre-treatment	40	50	45	3.1	
1 month	39	50	44.4	3.1	
3 months	30	40	35.9	3.1	
6 months	25	35	29.3	3.2	
BMI					.002
Pre-treatment	14	25	19.5	3.2	
1 month	14	22	18.3	1.8	
3 months	10	15	13.6	1.5	
6 months	8	12	10.1	1.7	

* Repeated measure ANOVA.

In **(Table 3),** the NRI decreased from 94.9 before initiation of treatment to 93.8 at 1 month, 80.8 at 3 months, and 72.2 at 6 months.The PNI decreased from 45 before treatment to 44.4 at 1 month, 35.9 at 3 months, and 29.3 at 6 months. The BMI decreased from 19.5 before treatment to 18.3 at 1 month, 13.6 at 3 months, and 10.1 at 6 months.

Regression Analysis

A binary Logistic regression analysis was carried out to demonstrate the major determinants of poor nutritional outcomes, using age, gender, smoking, comorbidities, stage, tumour location, and treatment modality as independent variables, and NRI, PNI, and BMI as dependent variables. As demonstrated in (**Table.4**), advanced tumor stage, upper GIT tumors and CTR only treatment were major risk factors for poor nutritional status (Wald test, *P* value < .05).

In **(Table 4),** Regarding tumor stage, stage IV tumor increased the risk of poor nutritional status by 4.2, 4.0, and 4.5 times as measured by NRI, PNI, and BMI, respectively.

Regarding tumor location, upper GIT tumors increased the risk of poor nutritional status by 5.6, 5.7, and 6.2 times as measured by NRI, PNI, and BMI, respectively.

Regarding treatment modality, CTR only regimen increased the risk of poor nutritional status by 3.3, 3.5, and 3.0 times as measured by NRI, PNI, and BMI, respectively.

Table 4. Binary Logistic Regression (n = 300)

	NRI	PNI	BMI	*P* value
Age	1.1 (0.1:2.2)	1.2 (0.3:2.4)	1.4 (0.2:2.5)	> .05
Gender				
Female vs Male	1.0 (0.5:1.5)	1.3 (0.4:1.5)	1.2 (0.7:1.6)	> .05
Smoking	1.5 (0.2:5.1)	1.2 (0.2:6.1)	1.7 (0.2:2.3)	> .05
Comorbidities	1.3 (0.8:2.0)	1.5 (0.5:2.2)	1.8 (0.4:2.8)	> .05
Stage				
IV vs I, II, III	4.2 (2.1:5.5)	4.0 (2.5:5.6)	4.5 (3.0:5.8)	< .05
Location				
Upper GIT vs Other Locations	5.6 (4.0:6.5)	5.7 (4.8:7.0)	6.2 (4.5:7.2)	< .05
Treatment Modality				
CTR alone vs CTR + Local ttt	3.3 (1.5:4.6)	3.5 (2.5:5.1)	3.0 (1.5:4.0)	< .05

Data are presented as odds ratio (95% confidence interval).

Discussion

Cancer has become one of the most common debilitating systemic diseases, and it's responsible for a large number of worldwide deaths annually. Cancer diagnosis has nearly always associated with malnutrition with different degrees, starting from appetite loss leading to entangled oral supply ending with malignant cachexia and sarcopenia and finally may be death from deteriorated general and nutritional condition and unbalanced essential body needs.

Noticeably , patients with cancer don't all have the same degrees of malnutrition, varied widely according to the site of cancer, its type, the general condition of the patient, symptoms associated and treatment modality the patient received. . Patients with Head and Neck tumors and those with GI malignancies are affected most

Mainly due to the disease burden, dominant certain histopathology and symptoms experienced by the patient that can interfere with oral intake as mucositis, gross lesions, dysphagia, altered taste, or obsecure the absorption of the essential elements. Not only does the cancer itself affect the nutritional status of the patient, but also anti cancer treatments have a vast role in modulating the patient's nutritional health.**(Sweetser S.2022)**

The aim of this study was to evaluate the nutritional state of cancer patients and correlate nutritional state with response and tolerability to the treatment line along with the survival of the patients and help to increase awareness to clinical application of nutritional therapy with oncological therapy.

We aimed for assessment of the general and nutritional condition of the presented patients ,monitoring them during the period of treatment, interpretation of newly developed complains according to the MUST scale and interference with supportive measures when needed. And find out if there is a direct relation between the patient's type of cancer(**Jacobs SR et al. , 2007)**

In the first visit, anthropometric measures of the patients' were taken with a brief history and documentation of the main complain and the symptoms urged them to seek medical advice.

Being the most sensitive and liable ; weight was the factor assessed to detect changes occurred. And weights in different stages of the disease and treatment for each patient were compared.

some types of cancers where unintended profound weight loss was the first urge to seek medical consultation and disclose the underlying cause. Which coincides with **(Rock CL et al .,2012)**

Malnutrition in cancer patients is a common , underestimated and multi-factorial condition. Its prevalence can extend up to 85% of cancer patients presenting physical, clinical, and psychological implications. The lowered tolerance to anti-neoplastic therapy, increased risk of complications, poor quality of life and higher mortality have been highlighted. In general oncology patients show a more serious nutritional injury and therefore, chances of complications are higher. Malnutrition in cancer patients is a common , underestimated and multi-factorial condition. Its prevalence can extend up to 85% of cancer patients presenting physical, clinical, and psychological implications. The lowered tolerance to anti-neoplastic therapy, increased risk of complications, poor quality of life and higher mortality have been highlighted. **(dos santos et al. ,2016).** In general oncology patients show a more serious nutritional injury and therefore, chances of complications are higher.

The problem is that in many times, these patients are not screened, or when they are, it is too late to change the nutritional prognosis. **(Borges et al. , 2009)**

Routine screening for malnutrition should be implemented for people in at-risk groups. In this study , Nutritional status was assessed using nutrition risk index (NRI), prognostic nutrition index (PNI), and body mass index (BMI) pre-treatment and post-treatment at 1, 3, and 6 months.

significant decline was found in NRI, PNI, and BMI at last follow-up which coincides with(**Ryu SW et al .,2010)**

A binary Logistic regression analysis was carried out to demonstrate the major determinants of poor nutritional outcomes, using age, gender, smoking, comorbidities, stage, tumor location, and treatment modality as independent variables, and NRI, PNI, and BMI as dependent variables., advanced tumor stage, upper GIT tumors and CTR only treatment were major risk factors for poor nutritional status (Wald test, P value < .05).

Regarding tumor stage:

stage IV tumor increased the risk of poor nutritional status by 4.2, 4.0, and 4.5 times as measured by NRI, PNI, and BMI, respectively.

Regarding tumor location: upper GIT tumors increased the risk of poor nutritional status by 5.6, 5.7, and 6.2 times as measured by NRI, PNI, and BMI, respectively as said by**(Santarpia L et al ., 2011)** which showed that oral mucositis disrupts the function and integrity of the oral cavity, affecting a satisfying oral food intake and negatively influencing treatment outcomes and quality of life. It is associated with significant clinical morbidity, which may include pain, dysphagia, malnutrition, and local and systemic infections

Regarding treatment modality:CTR only regimen increased the risk of poor nutritional status by 3.3, 3.5, and 3.0 times as measured by NRI, PNI, and BMI, respectively which coincides with**(Ravasco P et al ., 2019)** said that Chemotherapy is one of the most aggressive cancer treatments and may have serious adverse effects. Because malnutrition is considered increasingly important in the setting of cancer

Nutritional status is commonly used as a predictive and prognostic tool in cancer patients receiving antineoplastic treatment**(Balducci L et al . , 2010)**

The body mass index, oral intake amount, and recent body weight change are the most common markers used in the diagnosis of the patient's nutritional status

It was found, in this research, that the prognosis of the disease and treatment outcome may be affected directly by the nutritional status of the patient and may increase the incidence of superimposed infections .

The risk of malnutrition threatens the life of cancerous patients because it leads to the increased rate of different infections, requirements of further intense care, cost and hospitalization ,decreased immunity ,delayed wound healing, quality of life and physical

functions, disruption of the treatments, increased morbidity and mortality of the patients.

Indeed, people with cancer are among the most malnourished patient groups

Conclusion

Assessment of nutritional status in cancer patients is more accessible and designed through the application of MUST scoring system on the patients at the time of first presentation and along the treatment course. It allows signing down all symptoms and changes occur ,classification of the patients' conditions and design a treatment protocol according to the severity of the case

Unusual care provided to cancer patients and supportive and symptomatic treatments given to those who receive chemotherapy or combined regimens affect the outcome of the treatment remarkably , and help to improve the symptoms associating the treatment modality or the disease itself.

Ethical approval: The study was approved by the Research Ethics Committee of our institution.

Conflict of interest:The authors of the study have no conflict of interest related to this publication.

References

- **Balducci L, Colloca G, Cesari M, Gambassi G(2010),** Assessment and treatment of elderly patients with cancer. Surgical oncology, 19(3):117-23.
- **Ceppi F, Antillon F, Pacheco C, Sullivan CE, Lam CG, Howard SC et al. 2015** Supportive medical care for children with acute lymphoblastic leukemia in low-and middle-income countries. Expert review of hematology 8(5):613-26.
- **Cereda, Emanuelea; Pedrolli, Carlob (2009).** The geriatric nutritional risk index. Current Opinion in Clinical Nutrition and Metabolic Care: p 1-7
- **Elia M, Stratton RJ(2012),** An analytic appraisal of nutrition screening tools supported by original data with particular reference to age, Nutrition 28(5):477-94.
- **-Ikeya T, Shibutani M, Maeda K, Sugano K, Nagahara H, Ohtani H et al. 2015** Maintenance of the nutritional prognostic index predicts survival in patients with unresectable metastatic colorectal cancer. Journal of cancer research and clinical oncology 141(2):307-13.
- **Jacobs SR, Jacobsen PB, Booth-Jones M, Wagner LI, Anasetti C(2007**), Evaluation of the functional assessment of cancer therapy cognitive scale with hematopoetic stem cell transplant patients. Journal of pain and symptom management,1;33(1):13-23.
- **Jackson SF, Perkins F, Khandor E, Cordwell L, Hamann S, Buasai S(2006),** Integrated health promotion strategies: a contribution to tackling current and future health challenges. Health promotion international 1:75-83.
- **Ravasco P (2019).** Nutrition in cancer patients. Journal of clinical medicine. 14;8(8):1211.
- **Rock CL, Doyle C, Demark-Wahnefried W, Meyerhardt J, Courneya KS, Schwartz AL, Bandera EV et al . 2012.** Nutrition and physical activity guidelines for cancer survivors. CA: a cancer journal for clinicians.;62(4):242-74.
- **Ryu SW, Kim IH(2010).** Comparison of different nutritional assessments in detecting malnutrition among gastric cancer patients. World journal of gastroenterology: WJG. 7;16(26):3310.
- -Santarpia L, Contaldo F, Pasanisi F.(2011) Nutritional screening and early treatment of malnutrition in cancer patients. Journal of cachexia, sarcopenia and muscle.;2(1):27-35.
- **Singer P, Blaser AR, Berger MM, Alhazzani W, Calder PC, Casaer MP et al. 2019** ESPEN guideline on clinical nutrition in the intensive care unit. Clinical nutrition 38(1):48-79.
- **Stratton RJ, Hackston A, Longmore D, Dixon R, Price S, Stroud M et al. 2004** Malnutrition in hospital outpatients and inpatients: prevalence, concurrent

validity and ease of use of the 'malnutrition universal screening tool'('MUST') for adults. British Journal of Nutrition 92(5):799-808.

- **Sun K, Chen S, Xu J, Li G, He Y(2014).** The prognostic significance of the prognostic nutritional index in cancer: a systematic review and meta-analysis. Journal of cancer research and clinical oncology. 140(9):1537-49.
- **Sweetser S(2022),** Gastrointestinal manifestations of systemic diseases, Yamada's Textbook of Gastroenterology. 15:2231-73.