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RESEARCH ARTICLE

Inadequate Nutritional Status of Hospitalized Cancer Patients

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ABSTRACT

Objective: In oncology practice, nutrition and also metabolic activity are essential to support the nutritional status and prevent malignant cachexia. It is important to evaluate the patients and plan the maneuvers at the start of the therapy. The primary objective of the study is to define the nutritional status of hospitalized patients and the factors affecting it in order to define the most susceptible patients and maneuvers for better nutritional support.
Methods: Patients hospitalized in oncology clinic for therapy were evaluated for food intake and nutritional status through structured interviews. The clinical properties, medical therapies, elements of nutritional support were noted and predictors of inadequate nutritional status (INS) were analyzed.
Results: Four hundred twenty three patients, between 16-82 years old (median: 52) were evaluated. Nearly half of the patients (185, 43%) reported a better appetite at home than in hospital and declared that hospitalization is an important cause of loss of appetite (140/185, 75.6%). Presence of nausea/vomiting (N/V), depression, age less than 65 and use of non-steroidal anti-inflammatory drugs (NSAIDs) were associated with increased risk of INS in hospitalized cancer patients. On the contrary, steroid medication showed a positive impact on nutritional status of cancer patients.
Conclusion: N/V, younger age, presence of depression and NSAIDs medication were associated with INS in hospitalized cancer patients. Clinicians should pay more attention to this group of patients. In addition, unnecessary hospitalizations and medications that may disturb oral intake must be avoided. Corticosteroids are important tools for managing anorexia and INS.
Key words: Inadequate nutritional status, malnutrition, cancer cachexia.

INTRODUCTION

Palliative care is an important part of oncology practice and good practice can provide better quality of life. The presence of malignancy and associated malnutrition is inevitable. In addition, nutritional support is a crucial part of palliative care and usually difficult to manage. Malnutrition, which has an incidence approaching up to 98% in cancer patients, causes increased infection rates, complications, mortality and prolonged hospitalizations [1-3]. To identify malnourished patients and prevent catastrophic results of malnutrition, cancer patients should be evaluated for nutritional status (NS). Nutritional status is tried to be evaluated with anthropometric, laboratory and subjective measures but the heterogeneity of clinical status, body composition and medications can confound the results of the evaluation [1].

Malnutrition in cancer patients is multifactorial. Tumor related obstructive symptoms, especially in the gastrointestinal and head and neck tumors are the main cause of decreased oral intake [4,5]. Metabolic changes related to the tumor, decreased appetite and performance status, nausea and fatigue can affect the diet [6,7]. Besides tumor related causes, patients are also affected by both the cytotoxic

and other miscellaneous drugs. Oral intake of cancer patients is affected not only by the primary disease and therapy related consequences, but also by the psychosocial environment exposed during therapy. Although cancer related cytokines, cancer related metabolic changes, chemotherapeutic related anorexia are well studied, psychosocial issues are not clearly understood [8,9].

Evaluation and management of malnutrition and cancer cachexia is well analyzed and precious recommendations are present. However, management can be challenging in different populations with different sociocultural background. In the light of the limited data on cancer related malnutrition and management in our population [10-12], we evaluated the nutritional status of patients hospitalized in oncology clinic and tried to explore the factors affecting the nutritional status. The primary objective of the study is to define the nutritional status of hospitalized patients and the factors affecting it in order to define the most susceptible patients and maneuvers for better nutritional support.

METHODS

Between January 2013 and September 2014, patients hospitalized in oncology inpatient unit, Ankara University School of Medicine, medical oncology department, were eligible to enter the study. The patients treated in our inpatient clinic were mainly a group of patients hospitalized either for palliative support or medical therapy. Patients with any degree of neurocognitive or neuropsychiatric impairment and comorbidities in whom special diet should be practiced (hypertension, diabetes mellitus, heart failure) were excluded.

Participants were evaluated through structured interviews. The clinicopathological characteristics of patients (sex, age, body mass index (BMI), and primary site of the tumor, stage at the time of analysis, smoking and alcohol history) were noted. World Health Organization cutoff points were used to categorize BMI: obese (≥30), overweight (25–29.99), normal (18.5–24.99) and underweight (<18.5). Since the patients were analyzed at any time during their inpatient episode, spent time in the hospital till the questionnaire was recorded. The clinical properties at the time of interview (presence of nausea/vomiting (N/V), diarrhea or fever), interview history with a dietitian, drugs used (especially for appetite, psychiatric disorder, non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroids) and the parenteral or enteral nutrition support history were evaluated. The nutritional status of the patients was evaluated both during the interviews and direct observation by the staff charged for the interviews. The amount of food consumed during breakfast, lunch and dinner, snacks and the presence of extra food support in addition to supplied by the clinic were recorded. Quantity of the food consumed was recorded as the thirds of the total amount. The amount less than 2/3 of the meal was accepted as inadequate nutritional status (INS) in that meal. 2/3 and more consumption was recorded as "adequate". The factors associated with INS were analyzed. In addition, patients were also asked for their appetite in the hospital compared to their home.

Institutional Ethics Committee approved the study protocol, and the study was in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. All persons gave their informed consent prior to their inclusion in the study.

Statistical Analysis

Baseline characteristics of the patient group were described using means + SD for continuous variables, and frequencies and proportions for dichotomous and categorical variables. Primary sites of malignancies with more than 10% were grouped. To evaluate the effects of gastrointestinal cancers on nutrition, primary sites of malignancies were stratified into gastrointestinal and others. Esophagus, gastric and colorectal cancers are defined as gastrointestinal cancers. Differences between continuous variables were assessed with the Student t test and non-parametric tests for repeated measures (Friedman Test). The chi-square or Fisher exact tests were used to compare categorical variables. In multivariate analysis, the factors with a p value of less than 0.20 were analyzed by using a logistic regression model. All analyses were performed using SPSS 17.0 for Windows (IBM Corp., Armonk, NY). Values of p less than 0.05 were considered to be statistically significant.

RESULTS

Four hundred twenty three patients, between 16-82 years old (median: 52) were evaluated (Table-1). Male predominant group (75.7%) was mostly followed with a diagnosis of lung cancer. Body mass index of the patients ranged from 13.5 to 41.1 (median=24.3) kg/m^2. One third of the patients were under chemotherapy at the time of evaluation. There were N/V in 65(15.4%), diarrhea in 23 (5.4%) and fever in 42 (9.9%) patients. 77 patients (18.2%) had a diagnosis of depression and were under antidepressant therapy. In addition, 115 (27.2%) and 31 (7.3%) patients were under corticosteroid and anabolizing medication, respectively. While 45 (10.6%) patients were supported with enteral nutrition, 42 (9.9%) patients were under parenteral nutritional support.

Nearly half of the patients (185, 43%) reported a better appetite at home than in hospital and declared that hospitalization is an important cause of loss of appetite (140/185, 75.6%). One third of the patients (134, 31.7%) were eating extra food in addition to the meals provided by the hospital. The poor quality of the food provided by the hospital was the most reported reason for extra food consumption. Most of the patients reported that they ate their meals, 79.9% in breakfast, 72.8% in lunch and 74.2% in dinner. When the amount consumed was analyzed, percentage of patients who ate all the serving was 48.0%, 44.7% and 42.3% for breakfast, lunch and dinner respectively. The most important reason for not eating was loss of appetite (72.4%). The percentage of patients who ate "adequate" was 61.0%, 56.3%, 54.8% for breakfast, lunch and dinner, respectively.

The analysis of factors associated with INS was summarized in Table 2. When nutritional status was evaluated for breakfast;

multivariate analysis showed that, younger age (<65), N/V, depression, NSAIDs usage were associated with INS (Table 3). The multivariate analysis of factors associated with INS-lunch concluded that N/V, younger age, depression, NSAIDs usage and presence of diarrhea were associated with INS. The multivariate analysis of factors associated with INS-dinner resulted in an increased risk with N/V, younger age, depression and NSAIDs. In all meals, presence of corticosteroid medication was related with decreased risk of INS.

Table 1. Patient characteristics

Characteristics	N (%)
Sex	
Male	320 (75.7)
Female	103 (24.3)
Age (Years)	
Median (Range)	52 (16-82)
65 And Older	78 (18.4)
Primary Site	
Lung	133 (31.4)
Colorectal	68 (16.1)
Sarcoma/Bone Tm	68 (16.1)
Gastric	41 (9.7)
Other	113 (26.7)
Gastrointestinal System	109 (25.8)
Other	314 (74.2)
BMI (Kg/m$^{2)}$	
Underweight	66 (15.6)
Normal	177 (41.8)
Overweight	89 (21.0)
Underweight	91 (21.5)
Duration of Hospitalization (Day)	
Median (Range)	9 (1-77)
Chemotherapy During Evaluation	153 (36.2)

BMI: Body Mass Index

DISCUSSION

In our analysis, presence of nausea/ vomiting, depression, age less than 65 and use of NSAIDs were associated with increased risk of INS in hospitalized cancer patients. On the contrary, steroid medication showed a positive impact on nutritional status of cancer patients.

In cancer patients, with the progression of disease, malignant cachexia which is characterized by loss of weight, anorexia, asthenia and anemia ensues. Furthermore, with the increasing tumor size and metabolic activity, severe energy depletion becomes a problem. Cachexia is the cause of 22% of deaths in cancer patients. So, in addition to treating the primary pathology, the management of cachexia is an important part of the palliation [13]. Malnutrition is an important challenger of disease process. The prevalence of malnutrition has been estimated to range between 15% and 80% [14]. In addition, it has been associated with reduced quality of life, decreased response to treatment, increased risk of chemotherapy-induced toxicity and a reduction in survival [15]. Besides psychological support; megestrol acetate and dexamethasone as an appetite stimulant, antidepressant medication for depression related anorexia and metoclopramide for dyspepsia may further improve oral intake [16]. Enteral nutritional support and parenteral nutrition in prolonged negative nitrogen balance are further options [17,18].

In our study, hospitalized cancer patients with different properties were analyzed. The past experiences, medication and psychosocial factors are important for oral intake. Especially only by hospitalization, patients' nutrition progressively deteriorates [19]. This factor may be a result of the low quality of food, relations with other patients and diet recommended by doctors, so unnecessary inpatient follow-ups must be avoided.

The analysis of our cohort also showed a deterioration of NS with prolonged hospitalization. N/V related with primary disease, therapy toxicity or psychological issue is an important and challenging symptom in oncology practice. Our analysis confirmed the importance of N/V control on NS. In addition, site of the primary disease is an important predictor. Gastrointestinal malignancies have been associated with an increased risk of malnutrition [1,20]. In our cohort, even though it's not statistically significant, gastrointestinal malignancies were associated with INS and 72% of enteral-parenteral nutrition was performed in GIS malignancies. In this group, local recurrences and anatomical alterations due to surgeries are important causes of decreased oral intake. Furthermore, clinicians should pay more attention to them.

Depression is a precipitating factor for anorexia and well documented risk factor for malnutrition in chronic diseases. However, association between depression and malnutrition in cancer patients has been less clarified [21-23]. Britton et al. found depression as a risk factor for malnutrition of head and neck cancer patients and proposed a short depression screen to predict malnutrition [24]. The analysis by Daudt et al. showed that depression was the most significant predictor of increased nutritional risk in colorectal cancer patients [25]. Our analysis concluded an important association between depression and INS. This result pointed out the importance of psychological support in hospitalized cancer patients. There is conflicting data about age and malnutrition. A positive correlation has been shown between age and malnutrition risk [1,26]. However, in some of the date in literature, the association couldn't be demonstrated [27]. Similar with the data by Defranchi et al. [19] we documented young age as a risk factor for INS. Effects of drugs used for comorbidities are inevitable. In undernourished cancer patients, anti-inflammatory drugs have been associated with increased survival [28] and indomethacin has been shown to be effective in improvement of body composition during cancer process in rat model [29]. NSAIDs are important components of pain management in oncology practice. Unfortunately, there is no data about NSAID usage and its clinical consequences on NS. Pain is a well-defined risk factor for malnutrition [20,30,31]. In our study, pain was not associated with INS in multivariate

analysis. Irrespective of pain, NSAIDs were related with worse NS. In the cohort, all patients were under proton pump therapy. NSAID related dyspepsia should be further analyzed for the etiology of INS in hospitalized patients and these drugs should be used more cautiously. Corticosteroids are widely used in oncology practice. Short courses of corticosteroids can be used as an appetite stimulant [32,33]. In our analysis, presence of corticosteroid medication either for emesis, edema or malnutrition, was associated with improvement in oral intake in hospitalized cancer patients. Anabolic steroids are widely used as an appetite stimulant [34]. However, their effect couldn't be demonstrated in our analysis. Instead of anabolic drugs, cautiously used steroids can be a good option for management of INS.

In conclusion, N/V, younger age, presence of depression and NSAID medication were associated with INS in hospitalized cancer patients. Clinicians should pay more attention to this group of patients. In addition, unnecessary hospitalizations and medications that may disturb oral intake must be avoided. Corticosteroids are important tools for managing anorexia and INS.

Table 2. Predictors of inadequate nutritional status

Predictors	Inadequate Breakfast (N, %)	*P*	Inadequate Lunch (N, %)	*P*	Inadequate Dinner (N, %)	*P*
Sex						
Male	120 (37.5)		140 (43.8)		139 (43.4)	
Female	45 (43.7)	0.15	45 (43.7)	0.54	52 (50.5)	0.12
Age						
≥65	16 (20.5)		14 (17.9)		22 (28.2)	
<65	149 (43.2)	<0.001	171 (49.6)	<0.001	169 (49.0)	0.001
Primary Tm Site						
Gastrointestinal	44 (40.4)		50 (45.9)		50 (45.9)	
Other	121 (38.5)	0.41	135 (43.0)	0.34	141 (44.9)	0.47
Time Spent in Hospital						
≥9 Days	94 (43.5)		99 (45.8)		102 (47.2)	
<9 Days	71 (34.3)	0.03	86 (41.5)	0.21	89 (43.0)	0.21
Nausea/Vomiting						
Present	44 (67.7)		50 (76.9)		49 (75.4)	
Absent	121 (33.8)	<0.001	135 (37.7)	<0.001	142 (39.7)	<0.001
Diarrhea						
Present	12 (52.2)		17 (73.9)		16 (69.6)	
Absent	153 (38.3)	0.13	168 (42.0)	0.003	175 (43.8)	0.014
Fever						
Present	19 (45.2)		21 (50.0)		24 (57.1)	
Absent	146 (38.3)	0.23	164 (43.0)	0.24	167 (43.8)	0.06
Pain						
Present	116 (47.3)		120 (49.0)		124 (50.6)	
Absent	49 (27.5)	<0.001	65 (36.5)	0.007	67 (37.6)	0.005
Chemotherapy						
Present	40 (26.1)		53 (34.6)		57 (37.3)	
Absent	125 (46.3)	<0.001	132 (48.9)	0.003	134 (49.6)	0.009
Anabolizing Drugs						
Present	11 (35.5)		13 (41.9)		14 (45.2)	
Absent	154 (39.3)	0.41	172 (43.9)	0.49	177 (45.2)	0.57
NSAIDs						
Present	45 (64.3)		43 (61.4)		45 (64.3)	
Absent	120 (34.0)	<0.001	142 (40.2)	0.001	146 (41.4)	<0.001
Depression/Antidepressant						
Present	45 (58.4)		48 (62.3)		46 (59.7)	
Absent	120 (34.7)	<0.001	137 (39.6)	<0.001	145 (41.9)	<0.001
Corticosteroids						
Present	30 (26.1)		31 (27.0)		33 (28.7)	
Absent	135 (43.8)	0.001	154 (50.0)	<0.001	158 (51.3	<0.001

NSAIDs: Non-steroidal anti-inflammatory drugs

Table 3. Multivariate analysis of factors associated with inadequate nutritional status

Predictors	Inadequate Breakfast			Inadequate Lunch			Inadequate Dinner		
	OR	CI (95%)	*P*	OR	CI (95%)	*P*	OR	CI (95%)	*P*
Nausea/ Vomiting	4.8	2.5-9.2	<0.001	5.7	2.9-11.1	<0.001	4.4	2.4-8.7	<0.001
Age <65	2.1	1.1-3.9	0.015	3.1	1.6-5.8	<0.001	1.7	0.9-3.0	0.04
Depression/Antidepressant	2.5	1.4-4.5	0.002	2.8	1.4-4.8	<0.001	2.2	1.1-3.6	0.006
Diarrhea	1.3	0.5-3.4	0.54	3.2	1.1-9.1	0.033	2.0	0.8-6.2	0.13
Steroid	0.5	0.2-0.8	0.014	0.4	0.2-0.7	0.001	0.4	0.2-0.6	0.001
NSAIDs	3.3	1.8- 6.0	<0.001	2.2	1.2-4.0	0.009	2.4	1.3-4.4	0.003
Pain	1.8	0.9-3.5	0.09	1.3	0.6-2.5	0.40	1.6	0.8-3.1	0.14
Chemotherapy	0.4	0.3-1.3	0.27	0.7	0.3-1.0	0.40	0.9	0.4-1.1	0.93
Female Sex	1.4	0.8-2.3	0.17				1.3	0.9-2.3	0.17
≥9 Days Hospitalization	0.9	0.5-1.5	0.82						
Fever							1.5	0.6-2.7	0.22

NSAIDs: Non-steroidal anti-inflammatory drugs

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