

## ASSESSMENT OF NUTRITIONAL RISK IN CANCER PATIENTS TREATED WITH SYSTEMIC ANTINEOPLASTIC TREATMENT

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### Summary

This study aims to explore if there is a change in nutritional risk and body mass index (BMI) in cancer patients during the systemic antineoplastic treatment. We retrospectively analyzed data collected from 216 cancer patients treated at the Department of Medical Oncology, University Hospital for tumors, Sestre Milosrdnice University Hospital Center, Zagreb, Croatia, with systemic antineoplastic therapy in the period from 05/2016 to 05/2018. In our study, we included both patients treated with systemic therapy for the first time and patients treated repeatedly (only patients who have had at least six months free period after the last treatment course were eligible). We included male and female patients with breast cancer, colorectal cancer, pancreatic cancer, and head and neck cancer. Around 75% of patients had metastatic disease. We analyzed data collected from Nutritional Risk Score-2002 (NRS-2002) screening and results of BMI, at first hospitalization, and after three months of systemic antineoplastic treatment. All patients at high nutritional risk (NRS 3-4) received the nutritional intervention, which included enteral nutritional supplement and education of patient and patient's family about nutrition in oncological patients. We used the Wilcoxon test for the NRS score and t-test for a depended variable for BMI data. The initial average BMI of all patients was 26,45 kg/m<sup>2</sup>. Of all screened patients, around 78% of them were at mild nutritional risk (NRS 1-2), while around 22% of them were at high nutritional risk (NRS 3-4). We recorded a statistically significant decrease both in NRS of the entire screened population of patients after three months of systemic antineoplastic treatment and after specific nutritional intervention in high-risk patients (most patients were at mild nutritional risk, while less than 8% of them were at high nutritional risk). There was no significant change in BMI in the observed period (average BMI was 26, 59 kg/m<sup>2</sup>). It seems, systemic antineoplastic treatment, along with early nutritional intervention with enteral nutritive supplementation and education, can significantly contribute to the decrease of the nutritional risk.

KEYWORDS: *nutritional risk (NR), body mass index (BMI), systemic antineoplastic treatment*

### PROCJENA NUTRITIVNOG RIZIKA BOLESNIKA TIJEKOM SUSTAVNOG ANTINEOPLASTIČNOG LIJEČENJA

#### Sažetak

Cilj ovog rada je procijeniti promjena u nutritivnom riziku i indeksu tjelesne mase (ITM) onkoloških bolesnika tijekom sustavnog antineoplastičnog liječenja. Retrospektivno su analizirani podatci 216 bolesnika koji su od 05/2016 do 05/2018 liječeni na Odjelu internističke onkologije Klinike za tumore, KBC Sestre milosrdnice, Zagreb, Hrvatska. Obuhvaćeni su bolesnici po prvi put liječeni sustavnom antineoplastičnom terapijom i/ili koji u prethodnih 6 mjeseci nisu bili liječeni niti jednim vidom onkološkog liječenja. Zastupljeni su bolesnici obaju spolova, oboljeli od raka dojke, debelog i završnog crijeva, gušterače te glave i vrata. Oko 75% bolesnika imalo je metastatsku bolest. Korišteni su rezultati NRS 2002 nutritivnog probira te rezultati indirektno procjene sastava tijela izračunom indeksa tjelesne mase (ITM) prilikom prve hospitalizacije te

nakon 3 mjeseca sustavnog antineoplastičnog liječenja. U svih bolesnika koji su bili u visokom nutritivnom riziku (NRS 3-4) je provedena nutritivna intervencija uvođenjem enteralne prehrane te edukacije bolesnika i obitelji o prehrani onkoloških bolesnika. Za statistički izračun su korišteni Wilcoxonov test za podatke o NRS-u te t-test za zavisne uzorke za podatke o ITM-u. Inicijalni prosječni ITM je na početku liječenja bio 26,45 kg/m<sup>2</sup>. Inicijalnim nutritivnim probirom je utvrđen blagi nutritivni rizik (NRS 1-2) u oko 78% bolesnika, a oko 22% bolesnika je bilo u visokom nutritivnom riziku (NRS 3-4). Nakon 3 mjeseca specifičnog onkološkog liječenja te provođenja nutritivne potpore u visoko ugroženih bolesnika, zabilježen je statistički značajan pad u nutritivnom riziku u ukupnoj ispitivanoj populaciji (većina bolesnika je bila u blagom nutritivnom riziku, dok je manje od 8% bolesnika bilo visokog nutritivnog rizika). U periodu praćenja nije bila zabilježena značajnija promjena u indeksu tjelesne mase (prosječni ITM je bio 26,59 kg/m<sup>2</sup>). Sustavno antineoplastično liječenje uz ranu nutritivnu intervenciju i edukaciju doprinosi smanjenju znakova bolesti i poboljšanju općeg stanja bolesnika te može značajno smanjiti nutritivni rizik.

**KLJUČNE RIJEČI:** nutritivni rizik (NR), indeks tjelesne mase (ITM), sustavno antineoplastično liječenje

## INTRODUCTION

Weight loss, nutritional risk, and malnutrition are frequent problems in cancer patients and is often the presenting sign of malignant disease. The physiological abnormalities due to the tumor (malabsorption, obstruction, diarrhea, vomiting), the host response to the tumor (causing anorexia and altered metabolism), and the side-effects of anticancer treatment can all cause weight reduction (1,2). Older publications reported that the frequency of weight loss and malnutrition in cancer patients ranges from 31-87%, depending on the tumor site and stage (3). This data is consistent with newer publications in which nutrition risk prevalence ranges from 25% to over 70% based on nutritional assessment (4). According to the World Health Organization, in 2016, 39% of adults were overweight - 39% of men and 40% of women (5). Therefore it became challenging to identify malnutrition in the overweight population and, consequently, those in needing nutritional intervention. Although unintentional weight loss is one of the first signs of malignancy, obese patients underestimate the importance of that sign and usually do not report it to their physicians. Davidson et al. reported in their study 23 malnourished patients with normal or increased body mass index (BMI), which suggests that BMI and self-reporting of symptoms are not reliable measures for identifying all patients at risk of malnutrition or with poor nutritional status (6).

Specific oncological treatment and cancer itself, cause metabolic and physiological alterations that affect the nutritional status of patients (7). Patients usually report chemotherapy-induced nausea and vomiting, dysgeusia, diarrhea, or consti-

pation as a common side - effects of systemic anti-cancer treatment, which also has an impact of deficient alimentation and malnutrition. Adverse outcomes such as increased morbidity, poor prognosis, intolerance of treatment, and a decrease in quality of life can all be exacerbated by malnutrition. This study aims to explore the change in nutritional risk and body mass index (BMI) in cancer patients during the systemic antineoplastic treatment.

## MATERIAL AND METHODS

We retrospectively analyzed data collected from 216 cancer patients who were treated at the Department of Medical Oncology with systemic antineoplastic therapy in the period from 05/2016 to 05/2018. In our study, we included both patients treated with systemic therapy for the first time and patients treated repeatedly (only patients who have had at least six months free period after the last treatment course were eligible). We included male and female patients with breast cancer, colorectal cancer, pancreatic cancer, and head and neck cancer. For nutritional assessment, we used the validated NRS-2002 screening tool on the first day of each hospitalization. It consists of an initial assessment that analyzed body mass index (BMI), history of weight loss in the last three months, changes in food intake, and severity of the underlying disease. We continue the assessment if there are one or more affirmative answers with final screening that analyzes the nutritional status and severity of disease (8). BMI was calculated as measured weight in kilograms and height in meters on the first day of hospitalization ( $BMI = \text{kg}/\text{m}^2$ ). We

**Table 1.**  
CHARACTERISTICS OF CANCER PATIENTS IN STUDIED  
N = 216

		N	%
Gender	Male	97	44,9%
	Female	119	55,1%
Site of disease	BC	62	28,7%
	CRC	139	64,4%
	HNC	12	5,6%
	PC	3	1,4%
Metastatic disease	No	55	25,5%
	Yes	161	74,5%
Age (years)	Mean	61,48	
	Minimum	31	
	Maximum	83	
Number of applied cycles of systemic antineoplastic treatment in observed period	Mean	5,17	
	Minimum	2	
	Maximum	8	

Abbreviations: BC - breast cancer; CRC - colorectal cancer; HNC - head and neck cancer; PC - pancreatic cancer

calculated the BMI on the first day of each subsequent hospitalization. According to BMI, patients were categorized as underweight (BMI <18,5), normal weight (BMI 18,5- 24,9), overweight (BMI 25-29,9) and obese (BMI >30) (9). We analyzed data collected from NRS-2002 screening and results of BMI, at first hospitalization, and after three months of systemic antineoplastic treatment. All patients at high nutritional risk (NRS 3-4) received the nutritional intervention, which included enteral nutritional supplement and education of patient and patient’s family about nutrition.

Statistical analysis was based on the Wilcoxon test for the NRS score and Student’s t-test for a depended variable for BMI data.

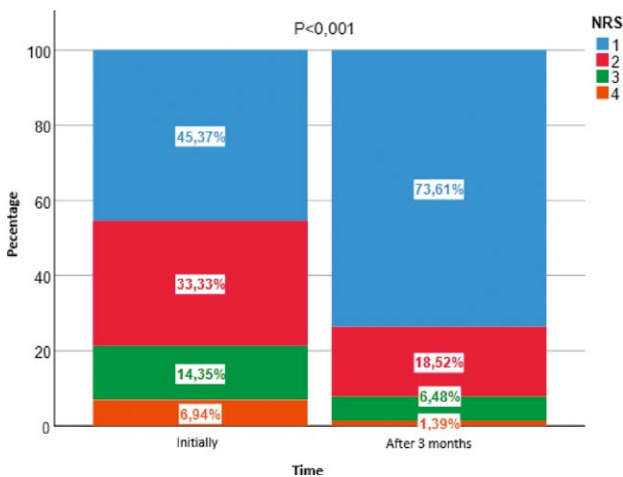
**RESULTS**

The majority of our 216 patients in the study, 74.5% of them, were in the metastatic stage of the disease. Most of the patients had colorectal cancer

**Table 2.**  
DESCRIPTIVE STATISTICS OF ANALYSED BMI AND NRS

	N	Mean	SD	Minimum	Maximum	Percentiles			P value
						25 <sup>th</sup>	50 <sup>th</sup> (Median)	75 <sup>th</sup>	
BMI (initially)	216	26,45	4,22	15,03	38,30	23,33	26,24	29,15	0,218
BMI (after 3 months)	216	26,59	4,12	15,82	38,05	23,68	26,35	29,55	
NRS (initially)	216	1,83	0,92	1,00	4,00	1,00	2,00	2,00	<0,001
NRS (after 3 months)	216	1,36	0,67	1,00	4,00	1,00	1,00	2,00	

Abbreviations: BMI- body mass index; NRS: nutritional risk score



**Figure 1.** Statistically significant decrease in nutritional risk score during an observed period

(around 63%), followed by breast cancer (approximately 28%). The initial average BMI of all patients was 26.45 kg/m<sup>2</sup>. Of all screened patients, around 78% were at mild nutritional risk (NRS 1-2), while about 22% of them were at high nutritional risk (NRS 3-4) at the beginning of systemic antineoplastic treatment. Table 1 shows the general characteristics of the studied sample. We recorded a statistically significant decrease in NRS of the entire screened population of patients after three months of systemic antineoplastic treatment and after specific nutritional intervention in high-risk patients (most patients were at mild nutritional risk, while less than 8% of them were at high nutritional risk) (Figure 1). There was no significant change in BMI in the observed period (average BMI was 26.59 kg/m<sup>2</sup>) (Table 2).

## DISCUSSION

Our study showed that nutritional risk is still highly prevalent in oncological patients despite the multidisciplinary oncological treatments. The nutritional risk in the metastatic disease correlates with the burden of the disease and the number of comorbidities (10). Hebutern and al. stressed the importance of nutritional treatment in the overall treatment strategy (11). The general population is overweight, which is consistent with mean BMI in our study, and three month period is too short to follow up with a significant change in BMI. Our results of a decrease in NRS during systemic treatment in three months period due to nutritional intervention is consistent with one recent study of Matelaro and al. (12). They also pointed out the importance of awareness of potential nutritional risk in cancer patients and value that dietary/nutritional measures from the start of treatment aim to improve the nutritional status or even prevent its deterioration. Early nutritional intervention with enteral nutritive supplementation and education of patients and their families about dietary needs and the importance of nutritional support significantly contribute to decreasing the nutritional risk.

## CONCLUSION

Nutritional assessment and early nutritional intervention should be incorporated into the therapy plan for each cancer patient from the beginning since it improves cancer therapy tolerance and the quality of life. Existing nutritional assessment tools recognize patients at nutritional risk. The importance of continuous nutritional interventions throughout the care of oncology patients needs to be recognized by all concerned with malignant disease management.

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