

The analysis of oral nutritional supplements related aspects among patients with digestive system cancer

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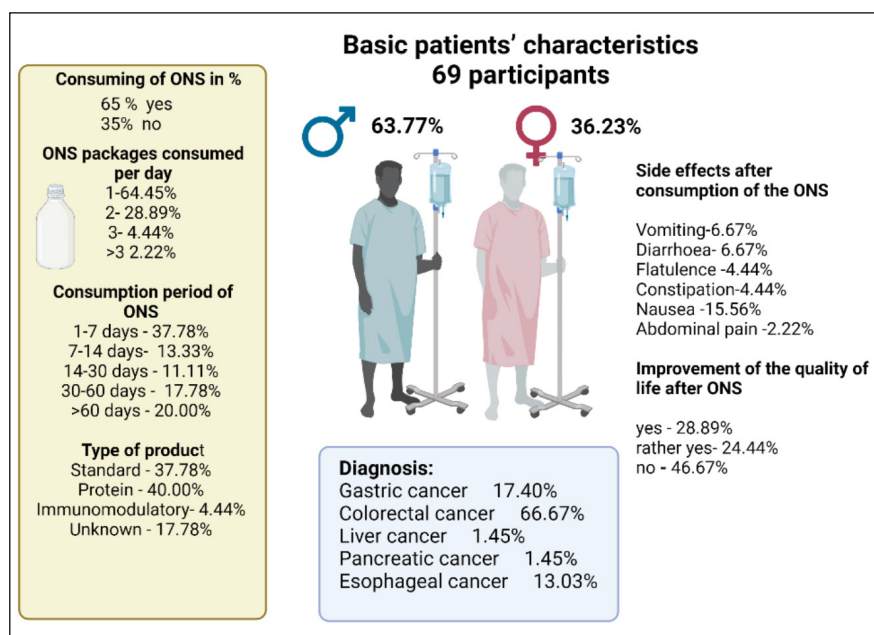
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Abstract. – OBJECTIVE: Malnutrition-related disease particularly occur in patients with digestive system cancer. The administration of oral nutritional supplements (ONSs) is one of the methods of nutritional support recommended for oncological patients. The primary aim of this study was to assess the consumption-related aspects of ONSs among patients with digestive system cancer. The secondary aim was to assess the impact of ONSs consumption on the quality of life of these patients.

PATIENTS AND METHODS: The current study included 69 patients with digestive system cancer. The assessment of ONSs-related aspects among cancer patients was conducted using a

self-designed questionnaire, which has been accepted by Independent Bioethics Committee.

RESULTS: Among all patients, 65% of participants declared that they consumed ONSs. Patients consumed various types of ONSs. However, the most common were protein products (40%) and standard products (37.78%). Only 4.44% of patients consumed products with immunomodulatory ingredients. Nausea was the most commonly (15.56%) observed side effect after ONSs consumption. Considering particular types of ONSs, side effects were the most commonly declared by patients who consumed standard products ($p=0.157$). The easy product availability in the pharmacy was noted by 80% of participants.



Graphical Abstract. Basic patients' characteristics.

However, 48.89% of patients assessed the cost of ONSs as not acceptable (48.89%). 46.67% of studied patients did not observe the improvement of quality of life after ONSs consumption.

CONCLUSIONS: We have demonstrated that patients with digestive system cancer consumed various period, amount, and types of ONSs. Side effects after ONSs consumption occur rarely. However, the improvement of quality of life related to ONSs consumption was not noted in almost half of participants. ONSs are easily available in pharmacy.

Key Words:

Digestive system cancer, Oral nutritional supplements, Malnutrition, Quality of life.

Introduction

Nutritional support is an important part of complex and interdisciplinary anti-cancer therapy^{1,2}. Malnutrition, which commonly occurs in patients with digestive system cancer, impairs physical as well as mental body functions, prolongs hospital stay, and also increases the cost of treatment³⁻⁶. In 2020, it was noted that most of the patients with advanced head/neck, esophageal, and gastric cancer are malnourished or severely malnourished². Nutritional status was assessed using Global Leadership Initiative on Malnutrition criteria 2019 (GLIM 2019) and Subjective Global Assessment (SGA) method. It was also noted that severe malnutrition significantly impairs patients' quality of life in both psychological (GLIM stage 2, $p=0.0033$; SGA C $p=0.0310$) and somatic domains (GLIM stage 2, $p=0.0423$)². In another study Thoresen et al⁷ have shown that 65.22% of patients with advanced cancer were malnourished. Therefore, the introduction of an appropriate nutritional treatment of cancer patients is extremely needed.

There are several types of nutritional support, such as nutritional counselling, administration of oral nutritional supplements (ONSs), enteral and parenteral nutrition. ONSs play a significant role in management of disease-related malnutrition^{8,9}. ONSs contain a wide range of vitamins and minerals. They can also include immunomodulatory compounds, such as arginine, omega-3 fatty acids, and nucleotides¹⁰. There are available many types of ONSs. In case of cancer patients, ONSs are recommended to for instance managing sarcopenia, prevent or decrease the weight loss caused by tumor and anti-cancer therapy^{11,12}. Cereda et al¹³ have reported that ONSs improve

the maintenance of body mass, increase proteins and calories intake as well as beneficially affect patients' quality of life with head and neck cancers. Additionally, the authors observed that the use of ONSs is related to the better tolerance of anti-cancer treatment¹³.

Malnutrition affects commonly cancer patients, especially patients with digestive system. The administration of ONSs is a significant supportive treatment for cancer patients. It should be introduced early to prevent the development of malnutrition and next potentially malnutrition-related complications. Therefore, the primary aim of this study was to assess the consumption-related aspects of ONSs among patients with digestive system cancer. The secondary aim was to assess the impact of ONSs consumption on the quality of life of these patients.

Patients and Methods

Participants

Eligible patients (n=69) were recruited and enrolled to this prospective study in the Department of Surgical Oncology, Medical University of Gdansk, Poland. Inclusion criteria were age ≥ 18 years old, the presence of digestive system cancer and the obtaining of written informed consent.

Study Design

A total of 72 participants (intention to analyze) were assessed as eligible to this study. Then, 3 patients from 72 were excluded due to the lack of consent for participation in the study. The flow chart is presented in Figure 1. This study has been approved by Independent Bioethics Committee for Scientific Research at Medical University of Gdansk, Poland (number NKBBN/129/2021, NKBBN/129-647,703/2021, NKBBN/129-281/2022).

Outcomes

The assessment of ONSs-related aspects among cancer patients was conducted using own created questionnaire, which has been accepted by above mentioned Independent Bioethics Committee. This survey includes 10 questions regarding below included aspects:

- Age.
- Type of digestive cancer.
- Period of use of ONSs.
- Type of ONSs consumption (standard, protein, with immunomodulatory properties, unknown).

- Taste aspects of ONSs.
- Side effects associated with consuming ONSs (vomiting, diarrhea, constipation, nausea, abdominal pain, flatulence).
- The improvement of quality of life after ONSs consumption.
- Access to the ONSs in pharmacy.
- Economical aspects of ONSs.

Statistical Analysis

The statistical analysis was carried out using Microsoft Excel 2019 PL and STATISTICA version 13.0. The Chi-square test of independence was used to compare the number of side effects between the groups.

Results

The patients' characteristics are presented in Table I. 72 patients were assessed as eligible for this study. Among these patients, 3 patients did not agree to take part in this study, therefore the statis-

Table I. Basic patients' characteristics.

Patients (n=69)	
Age (years)	
Range	38-89
Average	66
Median	68
Gender (%)	
Male	63.77%
Female	36.23%
Diagnosis (%)	
Gastric cancer	17.40%
Colorectal cancer	66.67%
Liver cancer	1.45%
Pancreatic cancer	1.45%
Esophageal cancer	13.03%

tical analysis was conducted regarding 69 participants. Most of the participants who were enrolled to this study was colorectal cancer patients (66.67%), whereas the smallest groups were patients with pancreatic (1.45%) and liver cancer (1.45%).

Among all patients, 65% of participants declared the consumption of ONSs (Figure 2). Patients have taken various type of ONSs, howev-

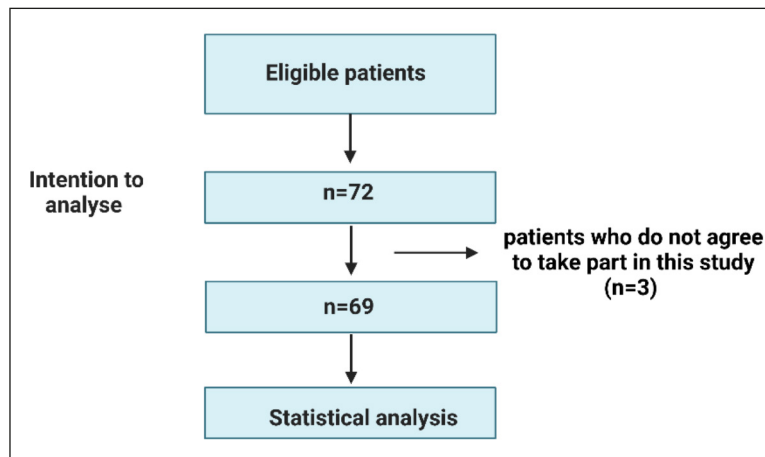


Figure 1. Participants flow chart.

Table II. The analysis of the amount of ONSs per day, period of consumption of ONSs, and type of consumed products.

Total number of packages of ONS consumed per day				
1	2	3	>3	
64.45%	28.89%	4.44%	2.22%	
Consumption period of ONSs				
1-7 days	7-14 days	14-30 days	30-60 days	>60 days
37.78%	13.33%	11.11%	17.78%	20.00%
Type of product				
Standard	Protein	Immunomodulatory	Unknown	
37.78%	40.00%	4.44%	17.78%	

Table III. The analysis of taste aspects, side effects of ONSs consumption, and the improvement of quality of life after ONSs intake.

Assessment of product taste – if it was tasteful					
Yes 40.00%	Rather yes 26.67%	No 33.33%			
Side effects after consumption of the product					
Vomiting pain 6.67%	Diarrhoea 6.67%	Flatulence 4.44%	Constipation 4.44%	Nausea 15.56%	Abdominal 2.22%
The improvement of the quality of life after consumption of the product					
Yes 28.89%	Rather yes 24.44%	No 46.67%			

er, they mostly consumed protein products (40%) as well as standard products (37.78%) (Table II). The period of intake of ONSs was also different. Most of the patients consumed ONSs for 1-7 days (37.78%), whereas the less common period of ONSs intake was 14-30 days (11.11%). One package of ONSs per day was most commonly consumed among patients (64.45%).

Most of the participants declared satisfaction of taste of ONSs (40%) (Table III). The side effects of ONSs consumption rarely occurred. Mostly patients experienced nausea (15.56%), vomiting (6.67%) as well as diarrhea (6.67%). Considering the particular types of ONSs, the most common side effects declared by patients were standard products (vomiting n=2, diarrhea n=2, flatulence n=2, constipation n=2, nausea n=3, abdominal pain n=1). In the rest of cases: unknown (vom-

iting n=2, diarrhea n=1, flatulence n=0, constipation n=0, nausea n=1, abdominal pain n=0), protein ONSs (vomiting n=0, diarrhea n=0, flatulence n=0, constipation n=0, nausea n=3, abdominal pain n=0), immunomodulatory (vomiting n=0, diarrhea n=0, flatulence n=0, constipation n=0, nausea n=0, abdominal pain n=0). Additionally, 46.67% of studied patients do not observe the improvement of quality of life after ONSs consumption. The impact of product type (standard vs. protein) on number of side effects was non-significant ($p=0.157$).

The easy product availability in the pharmacy was noted by 80% of participants (Table IV). 48.89% of patients assessed the cost of ONSs as not acceptable (48.89%), whereas 31.11% participants declared as “rather yes”.

Discussion

Both European Society for Clinical Nutrition and Metabolism (ESPEN) and American Society for Parenteral and Enteral Nutrition (ASPEN) recommend ONSs for cancer patients¹⁴⁻¹⁶. ONSs provide multiple benefits for patients. They are ready to use and contain balanced amount of nutrients¹⁴. Nowadays, ONSs are consumed by patients

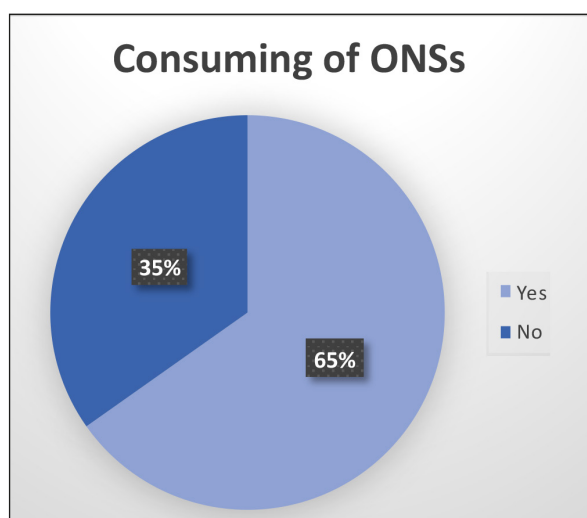


Figure 2. The declared consumption of ONSs by patients with digestive system cancer.

Table IV. The analysis of the access to the ONSs in the pharmacy and economical aspects.

Product availability in the pharmacy		
Yes 80.00%	Rather yes 13.33%	No 6.67%
Economical aspects – if the cost was acceptable		
Yes 20.00%	Rather yes 31.11%	No 48.89%

during various period/stage of anti-cancer treatment. Mostly, patients with digestive system cancer are treated with radiotherapy, chemotherapy, and surgery. ONSs are recommended for several reasons, among others, to prevent body mass loss, to gain weight, to provide vitamins and minerals and balanced meals¹⁷. Notably, immunomodulatory products (as ONSs or products given enterally) are recommended often in perioperative period due to the fact that they contain immunomodulatory ingredients (such as arginine, omega-3 fatty acids, nucleotides) thus they can improve not only the functioning of immune system¹⁸ but also positively affect the wound healing process after surgical treatment¹⁷. ONS may be effective in improvement of nutritional status of cancer patients undergoing chemotherapy. In Kim et al¹⁴ study it was assessed the effect of ONSs on pancreatic and bile duct cancer patients undergoing chemotherapy. This study included 58 participants which were divided into two groups, i.e., first receiving 2 packs of ONSs per 8 weeks (n=36) and control (non-ONSs) group (n=22). It was shown that fat mass increased in ONSs group whereas decreased in non-ONSs group. Moreover, Patient-generated Subjective Global Assessment (PG-SGA) and fatigue scores in Quality-of-Life Questionnaire Core 30 (QOL-C30) were improved in patients receiving ONSs¹⁴. The improvement of chemotherapy tolerance after ONS consumption was also confirmed in Tan et al¹⁹ study. Moreover, it was shown that the consumption of ONSs may reduce loss of skeletal mass as well as sarcopenia prevalence¹⁷. In the current study, 65% of patients with digestive system declared the consumption of ONSs. The period and number of consumed products were various; however, most participants have been intake ONSs for 1-7 days (37.78%) and 1 package (64.45%). The most consumed type of product was protein ONSs (40%) and standard products (37.78%), whereas products with immunomodulatory ingredients was taken only by 4.44% of participants. Taking these facts into consideration, immunomodulatory products are used very rare in the Polish patients' population. In a multi-center randomized clinical trial²⁰ (n=264) it was compared the influence of standard oral nutrition supplements and immunonutrition on complications in colorectal cancer patients in perioperative period. In a group of patients who received immunomodulatory products the infectious complications were reduced in comparison to participants who consumed standard products (23.8% vs. 10.7%, $p=0.0007$, respectively). Re-

cently, in meta-analysis it was also confirmed that the intake of ONSs in preoperative period (for 5-7 days) can decrease the postoperative inflammatory response as well as improve the nutritional status of patients²¹.

Notably, in the current study, 17.78% of participants assessed the type of ONSs as "unknown", therefore patients should be educated in this context to better understanding the role of nutritional treatment and to effectively fit with doctor/dietitian type of ONSs to patients' requirements.

The consumption of ONSs may be associated with side effects due to high content of calories in small volume and osmolarity. In the current study, nausea (15.56%), vomiting (6.67%) and diarrhea (6.67%) were the most commonly observed side effects after consumption of ONSs. Considering particular types of ONSs, the most common side effects were declared by patients who consumed standard products. However, we did not confirm significant difference between the groups of patients consuming standard vs. protein products ($p=0.157$). The main limitation of the statistical test was the number of subjects in two compared arms, and this is why it should be further investigated in future studies. However, all of the side effects after consumption of ONSs were observed rarely.

It is important to note that almost half of the patients did not observe improvements in the quality of life. The problem may be related to several reasons associated with ONS action and effectiveness, e.g., inappropriate preparation selection and irregular or impaired (incorrect amount/dose) ONS application by the patient. However, the problem might also lie in the patient' awareness. Many patients in the study have limited knowledge about ONS and their mechanism of action. During the study a lot of participants had problems in answering questions about quality of life because they did not know directly why they got the ONS and what is its function. It was the cause of question-related bias. Therefore, patients should be educated about ONSs that they receive. This education should include types of ONSs and their mechanisms of action.

In addition, for half of patient's population the price of ONS was unaffordable. Currently, in Poland ONS products are usually not reimbursed. Streeter et al²² study showed that abandonment from therapy is strongly dependent on the cost. Knowing that economical aspects limit the patients' use of ONS, the new system solutions should be implemented to make ONS available for patients with digestive system cancers. More-

over, 40% of patients declared satisfaction about the taste of ONS. Better products may decrease the rate of abandonment and medication errors in patients' population.

Currently, several trials²³ assessing the role of ONSs in cancer patients are also ongoing worldwide and their registrations are found in ClinicalTrials.gov system (searching by terms 'cancer' and 'ONS'). For instance, Chen et al²³ investigate the effects of ONSs on nutritional status and quality of life of esophageal cancer patients undergoing chemotherapy as well as radiotherapy. In ClinicalTrials.gov system there is a registered trial which assess the impact of enteral immunonutrition on the composition of gut microbiota, intestinal permeability, and inflammation in colorectal and gastric cancer patients in perioperative period (NCT04980950).

Conclusions

In summary, in the current study, we have demonstrated that patients with digestive system cancer consumed ONSs but different types of ONSs, amount, and during various period of consumption. Products with immunomodulatory components were rarely consumed among these patients. Most of the patients positively tolerate ONSs and the side effects were rarely noted. Nausea was the most commonly declared side effects after ONSs consumption. However, almost half of participants did not note the improvement of quality of life related to ONSs.

Conflict of Interest

The Authors declare that they have no conflict of interests.

Informed Consent

All patients provided a written consent to take part in this study.

Ethics Approval

This study has been approved by Independent Bioethics Committee for Scientific Research at Medical University of Gdansk, Poland (number NKBBN/129/2021, NKBBN/129-647,703/2021, NKBBN/129-281/2022).

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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