CLINICAL NUTRITION
DOI: 10.12957/demetra.2024.68454

DEMETRA
Alimentação, Nutrição & Saúde

e-ISSN:2238-913X

Amanda Cristina Torralbo Pugliesi

Simone dos Anjos Caivano[2]

Semíramis Martins Álvares Domene[3]

Fabiola Pansani Maniglia[1]

[1] Universidade de Franca[ROR], Curso de Nutrição. Franca, SP, Brasil.

[2] Universidade Metropolitana de Santos[ROR], Curso de Gastronomia e Nutrição. Santos, SP, Brasil.

[3] Universidade Federal de São Paulo[ROR], Instituto Saúde e Sociedade, Departamento de Políticas Públicas e Saúde Coletiva. Santos, SP, Brasil.

Correspondence
Amanda Cristina Torralbo Pugliesi
amandatorralbo@gmail.com

Assistant Editor
Larissa Calixto Lima

Food consumption of cancer patients: where are the inadequacies?

Consumo alimentar de pacientes oncológicos: onde estão as inadequações?

Abstract

Introduction: Eating habits can directly influence the individual's health status, and modulate the risk for Chronic Non-Communicable Diseases, such as cancer. *Objective*: To evaluate the diet quality of individuals undergoing cancer treatment. *Methods*: Descriptive cross-sectional study, with 50 adult individuals undergoing cancer treatment. To assess the diet quality, the 24-hour recalls were analyzed and the Diet Quality Index associated with the Digital Food Guide (DQI-DFG) was applied. The correlation of the DQI-DFG with the study variables was evaluated using Student's t-test, ANOVA and Pearson's correlation coefficient. *Results*: The study sample showed a predominance of females (68%), with a mean age of 58 years ± 12.0 years. The most common type of cancer among women was breast cancer (32%) and among men, intestinal cancer (6%). According to the DQI-DFG, most of the population studied was classified as having intermediate diet quality (66%), while 28% were classified as having low quality and only 6% as having good quality. Of the total sample, 48% of the patients were overweight and the most reported symptom was hyporexia, followed by nausea and vomiting. *Conclusion*: The diet quality of cancer patients was classified as intermediate, which indicates the need for interventions focused on dietary changes combined with the minimization of gastrointestinal symptoms to improve dietary intake and response to treatment.

Keywords: Quality of the diet. Side effects. Healthy eating. Nutrition.

Resumo

Introdução: Os hábitos alimentares podem influenciar diretamente no estado de saúde do indivíduo, e modulam o risco para doenças crônicas não transmissíveis, como o câncer. *Objetivo*: Avaliar a qualidade da dieta de indivíduos em tratamento oncológico. *Métodos*: Estudo transversal descritivo, com 50 indivíduos adultos em tratamento oncológico. Para a avaliação da qualidade da dieta, foram analisados os Recordatórios de 24 horas e aplicado o Índice de Qualidade da Dieta associado ao Guia Alimentar Digital - IQD-GAD. Foi avaliada a correlação do IQD-GAD com as variáveis de estudo por meio dos testes *t*-Student, ANOVA e coeficiente de correlação de Pearson. *Resultados*: A amostra do estudo apresentou predominância do sexo feminino (68%), com média de idade igual a 58 anos ± 12,0 anos. O tipo de neoplasia

mais ocorrente entre as mulheres foi de mama (32%) e entre os homens, de intestino (6%). De acordo com o IQD-GAD, a maioria da população estudada foi classificada com qualidade da dieta intermediária (66%), enquanto 28% foram classificados com baixa qualidade e apenas 6% com boa qualidade. Do total da amostra, 48% dos pacientes estavam com excesso de peso e o sintoma mais relatado foi hiporexia, seguido de náuseas e vômitos. *Conclusão*: A qualidade da dieta de pacientes oncológicos foi classificada como intermediário, o que indica a necessidade de intervenções focadas em mudanças alimentares combinadas à minimização dos sintomas gastrointestinais para melhorara ingestão dietética e a resposta ao tratamento.

Palavras-chave: Qualidade da dieta. Efeitos colaterais. Alimentação saudável. Nutrição.

INTRODUCTION

With the growing industrial and technological evolution in the world over the last few decades, society has faced a number of changes in dietary patterns. The accumulation of tasks and the shortage of time have led individuals to consume less *fresh* and minimally processed foods and to increase their intake of ultra-processed foods and fast *food*.[1,2]

According to Louzada et al,[2] Brazilians who consume ultra-processed foods have a high intake of total fat, saturated fat, *trans* fat, free sugar and sodium, as well as an insufficient intake of fibre and nutrients. This dietary profile goes against the recommendations of the Dietary Guidelines for the Brazilian Population and contributes to the development of obesity and other chronic non-communicable diseases (CNCDs), including cancer.[3,4]

According to the Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA - José Alencar Gomes da Silva National Cancer Institute), by 2030 it is estimated that there will be approximately 27 million new cases of neoplasms in the world and around 17 million deaths from the disease. In Brazil, the projections are also alarming: 625,000 new cases of malignant neoplasms are expected for the three-year period 2020-2022.[5,6]

The accelerated development of cancer, characterised by the rapid multiplication of malignant cells, has a direct impact on the quality of life and nutritional status of those affected. These impacts continue, or even intensify, with the side effects of antineoplastic treatments.[7]

Among the most common cancer treatments are surgery, radiotherapy, immunotherapy and chemotherapy, the latter being responsible for symptoms that are recognised by their side effects, such as: nausea, vomiting, inappetence, changes in taste, mucositis, stomatitis, diarrhoea, gastrointestinal damage, among others.[8-11] These symptoms, isolated or associated, lead to a reduction in energy and nutritional intake, contributing to the malnutrition often seen among cancer patients.[12]

In Brazil, the prevalence of malnutrition in cancer patients is around 44%, according to the multicentre study conducted by Waitzberg et al.[13] through the Inquérito Brasileiro de AvaliaçãoNutricional(IBRANUTRI- Brazilian Nutritional Assessment Survey). According to INCA, around 20 per cent of cancer deaths are due to malnutrition, rather than the oncological disease.[14]

Worsening malnutrition can lead patients to a state of cancer cachexia, characterised as a "multifactorial syndrome with continuous loss of musculoskeletal mass".[15] This depletion of muscle mass is called sarcopenia, which is directly associated with a reduction in the quality of life of these individuals and increased toxicity caused by chemotherapy, both in patients who are already malnourished and in those who are eutrophic and overweight.[16,17]

Generally, patients with tumours in the head and neck, oesophagus, stomach, colon, rectum, liver and pancreas are most affected by malnutrition, associated with the effects of chemotherapy, which interfere with their dietary quality.[17,18]

Given the scenario of worsening diet quality among Brazilians due to the increased intake of ultra-processed foods and considering the possibility of altered dietary intake due to illness and treatment, this study aimed to assess the diet quality of patients undergoing oncological treatment.

MATERIALS AND METHODS

Selection of individuals and study design

This is a descriptive cross-sectional study using secondary data from a retrospective study carried out in 2019 with 50 patients undergoing cancer treatment at a public hospital in the interior of the state of São Paulo .[8] The original study from which the data was collected had already been approved by the Research Ethics Committee of the same institution, under CAAE 17466319.8.0000.5438.

Data Collection

The following sociodemographic, clinical and anthropometric information was collected: gender, age, type of cancer, gastrointestinal symptoms, Body Mass Index (BMI), arm circumference and calf circumference.

Body mass (kg) was measured using a precision scale and height (cm) using a portable stadiometer. The anatomical landmarks protocol was carried out using the International Society for the Advancement of Kinanthropometry (ISAK) anthropometry method; all measurements were taken on the participant's right side.[19]

After calculating BMI, the classification used for adults was:[20]

- < 18.5kg/m^2:Underweight
- 18.5 to 24.9 kg/m^2: Eutrophy
- 25 to 29.9 kg/m^2:Overweight
- > 30 kg/m^2: Obesity

After calculating BMI, the classification used for the elderly was:[20]

- <21.9kg/m^2: Underweight
- 22 to 27 kg/m^2: Eutrophy
- 27.1 to 32 kg/m^2:Overweight
- > 32.1kg/m^2: Obesity

In order to assess the quality of these patients' diets, 24-hour food records (24HR) were filled in by them personally; one day's data was collected, this being a typical day in terms of dietary pattern; the 24HR were analysed using the Diet Quality Index Associated with the Digital Food Guide (IQD-GAD).[21] The 24HR data was entered into the NutrabemPro® *software*,[22] to estimate energy and nutrient intake and assess diet quality using the DQI-GAD.[21]

Diet Quality Index associated with the Digital Food Guide (IQD-GAD)

The IQD-GAD is an instrument developed to assess the quality of the diet of healthy individuals, based on the guidelines drawn up by Harvard University's School of Public Health, adjusted for Brazilian eating habits. To compose the index, foods are classified into groups according to their similarity in nutritional composition, andstandardised according to portions compatible with the essential criteria for health promotion. The IQD-GAD results are categorised into: "good quality", if the score is greater than or equal to 70; "intermediate quality", if the score is between 40 and 70; and "low quality", if the score is less than or equal to 40.[21]

Diet therapy for oncological patients aims to promote the supply of protective foods in order to maintain good nutritional status; therefore, the quality of the diet for these patients does not differ from an adequate and healthy pattern of food consumption.

Analysing the data

The Shapiro-Wilk normality test was applied to determine the other statistical tools to be used. The association between diet quality and the variables age, BMI and anthropometric measurements was checked using Pearson's Linear Correlation. The *t-Student* test was used to assess differences in diet quality in relation to gender; the same test was also used to analyse the different diet classifications in relation to the location of the neoplasm. The ANOVA test with Bonferroni *post hoc* was used to analyse the differences in diet quality according to BMI; and the chi-squared test was used to analyse the relationship between diet quality and the symptoms reported by patients as a result of chemotherapy and radiotherapy treatment. All the analyses were carried out using SPSS *software*, version 20.0, and the significance level adopted was 95%.

RESULTS

The study population was predominantly female (68%), with a mean age of 58.0 (SD=12.0) years. The most common type of neoplasm among women was breast cancer (32%) and among men, bowel cancer (6%).

Regarding the quality of the diet, the average final score was 50.2 (SD=14.8) points, with 66 per cent of the participants having a diet of intermediate quality, 28 per cent of low quality and only 6 per cent of the individuals having a diet classified as good quality. Table 1 shows the sociodemographic, clinical and anthropometric characteristics of the patients according to diet quality.

Table 1. Sociodemographic, clinical and anthropometric characteristics of patients according to the IQD-GAD classification. Franca (SP), 2021. (n=50)

Variable	Low quality (n = 14)		Intermediate (n = 33)		Good quality (n = 3)		Total (n = 50)	
	N	%	N	%	N	%	N	%
Sex								
Female	12	24	19	38	3	6	34	68
Male	2	4	14	28	0	0	16	32
Age								
29 to 40 yearsold	0	0	5	10	1	2	6	12
41 to 59 yearsold	9	18	8	16	2	4	19	38
60 to 70 yearsold	5	10	11	22	0	0	16	32
71 to 85 yearsold	0	0	9	18	0	0	9	18
Type of neoplasm								
Breast cancer	3	6	11	22	2	4	16	32
Bowel cancer	4	8	7	14	0	0	11	22
Laryngeal cancer	0	0	2	4	1	2	3	6
Others	7	14	13	26	0	0	20	40
Symptoms								
Diarrhoea	0	0	2	4	2	4	4	8
Adinamia	2	4	2	4	0	0	4	8
Constipation	0	0	2	4	0	0	2	4
Nausea	5	10	8	16	0	0	13	26
Vomit	5	10	6	12	1	2	12	24
Hyporexia	3	6	13	26	0	0	16	32
3 or more	1	2	3	6	0	0	4	8
Adult BMI								
Low weight	0	0	1	2	0	0	1	2
Eutrophy	2	4	5	10	2	4	9	18
Excess weight	7	14	7	14	1	2	15	30
Elderly BMI								
Low weight	1	2	5	10	0	0	6	12
Eutrophy	1	2	9	18	0	0	10	20
Excess weight	3	6	6	12	0	0	9	18

BMI: Body Mass Index | Diet quality: "good quality", score ≥70; "intermediate quality", score between 40 and 70; and "low quality", score <40.
Source: own elaboration.

The age (r=0.194, p=0.178) and gender (p=0.795) of the study participants was not associated with diet quality. There was also no association between IQD-GAD results and anthropometric variables, as shown in Table 2.

Table 2. Correlation between anthropometric variables and diet quality in cancer patients. Franca (SP), 2021. (n=50)

Variable	r	p-value
Armcircumference	0,1590	0,2700
Calfcircumference	0,1030	0,4780

Source: owne laboration.

Diet quality also did not differ according to the location of the neoplasm (p=0.625) or according to the symptoms reported by the patients. It is worth mentioning that diet quality did not differ even between patients with the concomitant presence of three symptoms (p=0.8892).

Table 3 shows the mean and standard deviation of portions consumed and scores for each of the food groups that make up the IQD-GAD, according to diet quality. The items with the highest mean scores were pulses and oilseeds, followed by vegetables and fruit, while the three food groups with the lowest mean scores were wholemeal cereals, tubers and roots, followed by the refined cereals group, and beef, pork or processed meat.

Table 3. Mean and standard deviation of the score for each food group consumed by cancer patients, according to IQD-GAD. Franca (SP), 2021 (n=50)

Food Groups	Low quality (n = 14)	Intermediate (n = 33)	Good quality (n = 3)
ModerationComponents			
Sugars and sweets	2,74 ± 2,16	4,27 ± 1,66	4,83 ± 0,30
Meat: beef, pork or processed meat	1,69 ± 2,17	2,35 ± 2,32	3,33 ± 2,89
Refinedcereals	0,99 ± 1,64	1,68 ± 1,95	2,63 ± 0,70
Processed fats	4,84 ± 0,60	4,84 ± 0,66	5,00 ± 0,00
SuitabilityComponents			
Poultry fish and eggs	2,27 ± 3,91	6,92 ± 5,71	12,50 ± 0,00
Wholegrain cereals, tubers and roots	0,43 ± 1,30	0,18 ± 0,39	0,00 ± 0,00
Fruits	3,11 ± 4,70	7,31 ± 5,74	8,79 ± 5,60
Vegetables	3,36 ± 2,14	8,42 ± 4,59	11,14 ± 6,54
Pulses and oilseeds	3,34 ± 5,52	9,63 ± 5,05	12,39 ± 2,43
Dairy products	4,27 ± 3,56	4,83 ± 3,86	6,67 ± 5,47
Oils and fats	3,30 ± 2,15	5,82 ± 2,05	7,50 ± 0,00
Total	30,35 ± 29,85	56,26 ± 33,96	74,78 ± 23,93

Source: owne laboration.

In terms of average portion consumption, the food groups classified as adequacy components were below the ideal intake range, with the exception of oils and fats, which were within the ideal range. On the other hand, the moderation food groups, refined cereals and beef, pork and processed meats were above the ideal intake range established by the IQD-GAD. The data is shown in Table 4.

Table 4. Mean and standard deviation of the portion of each food group consumed by cancer patients, according to the IQD-GAD and ideal intake intervals. Franca (SP), 2021

Food Groups	Portion	Intake interval	Classification
ModerationComponents			
Sugars and sweets	0,50 ± 0,67	0,0 - 0,5	In between
Meat: beef, pork or processed meat	1,08 ± 1,0	0,0 - 0,5	Above the range
Refinedcereals	1,95 ± 0,75	0,0 - 1,0	Above the range
Processed fats	0,13 ± 0,21	0,0 - 0,5	In between
SuitabilityComponents			
Poultry fish and eggs	0,46 ± 0,57	0,5 - 1,0	Below the range
Wholegrain cereals, tubers and roots	0,10 ± 0,30	2,0 - 3,0	Below the range
Fruits	0,80 ± 0,95	1,5 - 3,0	Below the range
Vegetables	1,10 ± 0,98	2,0 - 3,0	Below the range
Pulses and oilseeds	0,67 ± 0,71	1,0 - 1,5	Below the range
Dairy products	0,81 ± 0,69	1,0 - 1,5	Below the range
Oils and fats	1,11 ± 0,72	1,25 - 1,75	In between

Source: owne laboration.

DISCUSSION

The sample in this study was predominantly female, in advanced adulthood, and breast cancer was the most common neoplasm in this group. These demographic and clinical data are partially consistent with national findings. According to the 2020 estimates for the country published by INCA, cancer is actually more prevalent in people over the age of 50, although it is more likely to occur in men.[6]

The study carried out by Rodrigues et al.[23] with patients undergoing oncological treatment, attended by the Sistema Único de Saúde (SUS- Unified Health System), in a city in the interior of the state of São Paulo, like the present study, showed a predominance of female patients. The authors also found a higher occurrence of breast cancer among women,[23] as in this study and in the national data published by INCA.[6]

With regard to male patients, this study found that the highest incidence of cancer in men was colon and rectum cancer, followed by laryngeal cancer. Although national figures indicate that the highest incidence of cancer in men is prostate cancer, cases of bowel cancer have been on the rise in recent years, making it the second most common cancer not only in men, but also in women.[24] According to estimates published by INCA, 41,000 new cases of bowel cancer are expected in 2021.[6]

Regarding the results of the anthropometric assessment by BMI, most of the cancer patients in this study were overweight. This result is corroborated by data presented by the Associação Brasileira para o Estudo da Obesidade e da SíndromeMetabólica(ABESO- Brazilian Association for the Study of Obesity and Metabolic Syndrome), which shows that more than 55 per cent of the Brazilian population is overweight, with increasing projections in the coming years.[25]

Still on the prevalence of overweight, Miranda et al. conducted a quality of life assessment study with patients undergoing cancer treatment and also found a higher rate of overweight according to the BMI classification, especially among women with breast cancer.[26]

Although most of the patients in this study were overweight, there was also a proportion (24 per cent) of elderly people who were thin according to BMI. Pinho et al.[27] showed in a multicentre study of individuals undergoing cancer treatment that the elderly were at greater risk of malnutrition when compared to adults.

This same multicentre study also showed that gastrointestinal symptoms resulting from the side effects of treatment were more common among the elderly, the most common being lack of appetite, which was strongly associated with malnutrition.[27] Inappetence was also a symptom experienced by the participants in this study, affecting 40% of the elderly and having repercussions on the quality of their diet.

In this study, diet quality was assessed using the IQD-GAD.[21] The results of the application of this index showed a final average of 50 points, classifying the diet as intermediate quality.

In terms of food group scores, pulses had the highest average scores, as did vegetables and fruit. The higher score given to these food groups is explained by the IQD-GAD assessment criteria, which gives maximum points when these foods are consumed in accordance with the ideal consumption portion.[21]

It is worth mentioning that although fruit and vegetables had higher average scores, when analysed by the average portions consumed and compared to the ideal intake range, it was observed that the intake of this food group was still insufficient compared to the IQD-GAD guidelines.[21]

Insufficient consumption of fruit and vegetables is also demonstrated by Perin et al.,[28] in a study of 59 patients undergoing chemotherapy treatment, which found that most of the patients in the sample consumed fruit and vegetables every day, but not all of them reached the necessary daily recommendation established by the *Healthy Eating Index (HEI-2010)*.[29] Similar results were also seen in the study conducted by Zanchinet al.[30] with 50 women with breast cancer. The researchers found that the consumption of fruit and vegetables was insufficient and not very varied, compared to the recommendations of the Adapted Food Pyramid.[31]

It is known that the low consumption of fruit and vegetables does not only occur in the population of cancer patients who suffer from the side effects of treatment. According to the national telephone survey, Vigitel (Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey), published in 2020, more than 60 per cent of those interviewed showed that they did not have an appropriate dietary intake, with low consumption of fruit, vegetables and legumes.[32] These results are also presented in the analysis of food consumption in Brazil carried out by the IBGE Institute,[1] , which showed that a large part of the population has an insufficient consumption of fruit, vegetables and whole grains.

The legumes and oilseeds food group, as mentioned, also had the highest average IQD-GAD score,[21] which is due to the traditionally regular consumption of beans among Brazilians. However, despite being one of the groups with the highest average score, consumption was still insufficient, according to the ideal portion values established by the IQD-GAD.[21]

This consumption of pulses, although less than ideal, is explained by the results of the survey of food consumption in Brazil, carried out by the IBGE Institute.[1] The survey shows that rice and beans are still the most traditional dish for Brazilians, and that even with a reduction in consumption over the years from 2008 to 2017, these are still the foods most consumed by the population.

According to the results published by Vigitel (2020) on bean consumption among Brazilians, it was found that 59 per cent of those interviewed consumed beans frequently during the week and that men ate more than women. It was also observed that, for both sexes, frequent bean consumption tended to decrease with increasing schooling.[32]

Lima et al. published a study with a group of 183 individuals, case-control, in a hospital in Paraíba, regarding food consumption and its relationship with breast cancer. The authors found that the participants in the study mentioned beans as one of the foods they consumed most on a daily basis, and this was strongly associated with a reduction in the risk of breast cancer.[33] Similarly, the consumption of beans was also associated with a reduction in the risk of oral cavity cancer, as shown by the study by Marchioni et al, carried out with more than 800 individuals from Latin America.[34]

The wholemeal cereals, tubers and roots group contributed the least to the final DQI-GAD score,[21] because the patients in the sample consumed far less than the ideal portion. This result is similar to the study by Azevedo et al.[35] with cancer patients, in which it was found that the consumption of wholegrain foods was low and insufficient.

Insufficient consumption of wholegrains was also pointed out in the POF (Family Budget Survey) survey for 2017 and 2018, carried out by the IBGE. The survey showed that the consumption of fibre from grains and wholegrain foods fell in all age groups, most significantly among older women due to the deterioration in the quality of their diet.[1]

An interesting finding in this study was the adequate consumption of portions of sugars and sweets, which were within the ideal intake range adopted by the IQD-GAD.[21] This result contradicts the findings of national studies showing an increase in the consumption of this food group by the general population.[1,31] However, when it comes to cancer patients, studies have shown a relationship between low consumption of sweet foods and changes in taste caused by chemotherapy treatment.[8,36]

These changes in the taste buds of cancer patients were exposed by Maniglia et al.,[8] who, when assessing the perception of taste in patients undergoing antineoplastic treatment, found that sweet flavour was perceived more intensely by these patients. The same findings were found by Sanchéz-Lara et al.,[36] in a study with 60 individuals, in which the authors also perceived the sweet taste more intensely.

In short, when the average portions consumed by the patients in this study were analysed, the food groups classified as adequacy components, such as: poultry, fish and eggs; wholegrain cereals, tubers and roots; fruit; vegetables; legumes and oilseeds; milk and dairy products, showed insufficient consumption, with average portions below the ideal established by the IQD-GAD.[21] On the other hand, the food groups classified as moderate components - specifically, refined cereals and beef, pork and processed meats - showed inadequate consumption, with the average portion above the IQD-GAD ideal.[21]

Increased consumption of ultra-processed foods has been identified as one of the risk factors for developing chronic non-communicable diseases and, according to national data, 18.2 per cent of Brazilians consume five or more ultra-processed food groups every day, with this consumption being even higher among men.[2,32]

In the study conducted by Azevedo et al. with 20 cancer patients, consumption of red and processed meats was higher than recommended during the assessment week.[35] The same result was demonstrated by Gonçalves et al.,[37] in a study of 61 women with breast cancer, in which they had a higher consumption of meat than the recommendations of the Food Guide for the Brazilian Population, used as a criterion for analysis. Red and processed meats, when consumed in excess, increase the risk of developing malignant neoplasms. This relationship is demonstrated by the *International Agency for Research on Cancer*'s document on the relationship between red and processed meats and the process of carcinogenesis.[38]

On the other hand, in the same document, the authors state that meat contains proteins of high biological value and important micronutrients such as iron, B vitamins and zinc.[38] Therefore, for cancer

patients, the consumption of red meat is necessary because it is a source of iron, since iron deficiency anaemia is observed in a large number of individuals affected by the disease, not only due to the inflammatory processes resulting from cancer, but also due to the depreciation of food consumption in the face of the discomfort caused by the treatments.[39,40]

It's worth highlighting the importance of dietary technique when preparing food, especially meat. The IQD-GAD[21] does not consider preparation techniques and these can be relevant risk markers for assessing diet quality, especially in relation to cancer.[24]

We should also highlight an important limitation of the study, which was the application of the IQD-GAD[21] to assess the quality of the diet of cancer patients and the elderly, since it was created to assess a healthy, adult population. In addition, the method of assessing food intake using the R24H may contain errors, as well as not representing the individual's usual consumption, since it depends on the memory of the research participant who may have underestimated the consumption of foods seen as unhealthy, as well as overestimating foods known to be healthy. Even with the limitations reported, the results of this study can serve to develop strategies aimed at improving the dietary quality of patients undergoing cancer treatment, promoting changes in eating habits and lifestyle for a better quality of life for these individuals.

CONCLUSION

The IQD-GAD revealed that most of the cancer patients assessed had a diet of intermediate quality and a significant minority had a diet of good quality. The food groups that contributed to the high level of inadequacy were: refined cereals and red and processed meats, which were above the recommended level, and the groups of white meats, whole grains, fruit, vegetables, dairy products, pulses and oilseeds, which were below the recommended level.

These results reinforce the need for educational interventions in this population to improve nutritional status and response to cancer treatment.

ACKNOWLEDGEMENTS

To the staff and patients of theHospital do Câncer de Franca (Franca Cancer Hospital) and to the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brazil (CAPES - Coordination for the Improvement of Higher Education Personnel).

REFERENCES

1. Instituto Brasileiro de Geografia e Estatística. Coordenação de Trabalho e Rendimento. Pesquisa de orçamentos familiares 2017-2018: Análise do consumo alimentar pessoal no Brasil. Rio de Janeiro: IBGE; 2020. 114 p. ISBN 9786587201153

2. Louzada ML, Martins APB, Canella DS, Baraldi LG, Levy RB, Claro RM et al. Alimentos ultraprocessados e perfil nutricional da dieta no Brasil. Rev Saúde Pública, 2015; 49(38) 1-11. https://doi.org/10.1590/S0034-8910.2015049006132.

3. Ministério da Saúde. Secretaria de Atenção à Saúde. Guia Alimentar para a População Brasileira. Departamento de Atenção Básica. 2ª Edição. Brasília (DF): Ministério da Saúde; 2014. 156 p. ISBN 978-85-334-2176-9

4. World Health Organization (WHO). Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation. Geneva: WHO; 2003. 160 p. ISBN 92 4 120916 X

5. Instituto Nacional de Câncer José Alencar Gomes da Silva. ABC do câncer: abordagens básicas para o controle do câncer. 6ª Edição. Rio de Janeiro: Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA); 2020. 112 p. ISBN 978-85-7318-394-8

6. Instituto Nacional de Câncer José Alencar Gomes da Silva. Estimativa 2020: incidência de câncer no Brasil. Rio de Janeiro: Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA); 2019. 120 p. ISBN 978-85-7318-388-7

7. Pereira PL, Nunes ALS, Duarte SFP. Qualidade de vida e consumo alimentar de pacientes oncológicos. Rev. Bras. De Cancerologia, 2015; 61(3):243-251. https://doi.org/10.32635/2176-9745.RBC.2015v61n3.254.

8. Maniglia FP, Cruz LC, Costa LCM, Silva LCO, Oliveira BAP. Avaliação da percepção do paladar de pacientes oncológicos: relação com variáveis pessoais e clínicas e comparação com um grupo controle. Revista Brasileira de Cancerologia 2021; 67(1): e-11994. https://doi.org/10.32635/2176-9745.RBC.2021v67n1.994.

9. Takara FM, Morikawa W, Rivoir RV, Trevisan C, Tieko AE, Carvalho MG et.al. Avaliação nutricional em pacientes com câncer de cabeça e pescoço. Rev. Bras. Cir. Cabeça Pescoço, 2012;41(2): 70-74. ID: lil-641372.

10. Argilés JM, Anker SD, Evans WJ, Morley JE, Fearon KC, Strasser F, *et al.* Consensus on cachexia definitions. J Am Med Assoc. 2010; 11(4): 229-30. https://doi.org/10.1016/j.jamda.2010.02.004

11. Dias MV, Barreto APM, Coelho SC, Ferreira FMB, Vieira GBS, Cláudio MM, *et al*. O grau de interferência dos sintomas gastrointestinais no estado nutricional do paciente com câncer em tratamento quimioterápico. RevBrasNutr Clin, 2006; 21(3): 211-8.
12. Machry VR, Susin FC, Barros CR, Lago DL. Desnutrição em pacientes com câncer avançado: uma revisão com abordagem para o clínico. Rev AMRIGS, 2011; 55(3):296-301.ID: biblio-835371
13. Waitzberg DL, Caiffa WT, Correia IT. Hospital malnutrition: the Brazilian national survey (IBRANUTRI): a study of 4000 patients. Nutrition 2001;17(7-8):573-80.https://doi.org/10.1016/s0899-9007(01)00573-1

14. Brasil. Ministério da Saúde. Instituto Nacional de Câncer. Consenso nacional de nutrição oncológica. 2ª Edição. Rio de Janeiro: Instituto Nacional de Câncer (INCA), 2015. 182 p. ISBN 978-85-7318-154-8

15. Fearon K, Strasser F, Anker SD, Bosaeus I, Bruera E, Fainsinger RL, *et al.* Definition and classification of cancer cachexia: an international consensus. Lancet Oncol, 2011; 12(5):489-95. https://doi.org/10.1016/S1470-2045(10)70218-7

16. Tisdale MJ. Cancercachexia. CurrOpinGastroenterol, 2010; 26(2): 146-51. https://doi.org/10.1155/2011/601434.

17. Vega MCMD, Laviano A, Pimentel GD. Sarcopenia e toxicidade mediada pela quimioterapia. Einstein. 2016; 14(4): 580-4. https://doi.org/10.1590/S1679-45082016MD3740.

18. Poltronieri TS, Tusset C. Impacto do tratamento do câncer sobre o estado nutricional de pacientes oncológicos: atualização da literatura. Revista Brasileira de Ciências da Saúde, 2016; 20(4): 327-332. https://doi.org/10.4034/RBCS.2016.20.04.10.

19. Stewart A, Marfell-Jones M, Olds T, Ridder J. International Standards for Anthropometric Assessment. 3ª edition. New Zealand: International Society for the Advancement of Kinanthropometry; 2011. 115 p. ISBN 9780620362078, 0620362073.

20. World Health Organization. Obesity: preventing and managing the global epidemic. Geneva: WHO, 1997. 268 p. ISBN 92 4 120894 5

21. Caivano S, Colugnati FAB, Domeme, SMA. Diet quality index associated with digital food guide: update and validation. Cad. Saúde Pública, 2019; 35(9):e00043419. https://doi.org/10.1590/0102-311X00043419

22. Caivano S, Domene SMA. NutraBem Pro [Internet]. Brasil: Universidade Federal de São Paulo; número do registro 512022001589-7, 2009[Acesso 16 abr 2021] Disponível em: https://nutrabem.unifesp.br/

23. Rodrigues JSM, Ferreira NMLA. Caracterização do perfil epidemiológico do câncer em uma cidade do interior Paulista. Revista Brasileira de Cancerologia, 2010; 56(4): 431-441. https://doi.org/10.32635/2176-9745.

24. Ministério da Saúde. Secretaria de Atenção à Saúde. Instituto Nacional de Câncer. Coordenação de Prevenção e Vigilância. A situação do câncer no Brasil. Rio de Janeiro: Secretaria de Atenção à Saúde, Instituto Nacional de Câncer, Coordenação de Prevenção e Vigilância, 2006. 120 p. ISBN 85-7318-121-4

25. Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica. Mapa da obesidade [Acesso 03 maio 2021]. Disponível em: https://abeso.org.br/obesidade-e-sindrome-metabolica/mapa-da-obesidade/.

26. Miranda TV, Neves FMG, Costa GNR, Souza MAM. Estado Nutricional e Qualidade de Vida de Pacientes em Tratamento Quimioterápico. Revista Brasileira de Cancerologia, 2013; 59(1): 57-64. https://doi.org/10.32635/2176-9745.RBC.2013v59n1.544.

27. de Pinho NB, Martucci RB, Rodrigues VD, D'Almeida CA, Thuler LCS, Saunders C, et al. High prevalence of malnutrition and nutrition impact symptoms in older patients with cancer: results of a Brazilian multicenter study. Câncer, 2020; 126(1): 156-164. https://doi.org/10.1002/cncr.32437.

28. Perin LB, da Silva ACP, Bernardi JR, Vasconcellos SB. Qualidade da dieta de pacientes com câncer de mama em quimioterapia na Unidade de Alta Complexidade em Oncologia (UNACON) vinculada a um hospital público da Serra Gaúcha. Braspen J, 2017*; 32(2): 144-148.*ID: biblio-848148.

29. Guenther PM, Casavale KO, Reedy KO, Kirkpatrick SI, Hiza HAB, Kuczynski KJ et al. Update of the healthy eating index: HEI-2010. Journal of the Academy of Nutrition and Dietetics, 2013; 113(4): 569-580. https://doi.org/10.1016/j.jand.2012.12.016

30. Zanchin FC, Sivieiro J, Santos JS, Silva ACP, Rombaldi RL. Estado nutricional e consumo alimentar de mulheres com câncer de mama atendidas em um serviço de mastologia no interior do Rio Grande do Sul, Brasil. Rev. HCPA, 2011; 31(3): 336-44.

31. Philippi ST, Latterza AR, Cruz AT, Ribeiro LC. Pirâmide alimentar adaptada: guia para escolha dos alimentos. RevNutr Campinas, 1999;12:65-80. https://doi.org/10.1590/S1415-52731999000100006

32. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise em Saúde e Vigilância de Doenças Não Transmissíveis. Vigitel Brasil 2019: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2019. Brasília: Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Análise em Saúde e Vigilância de Doenças não Transmissíveis, 2020. 137 p. ISBN 978-85-334-2765-5

33. Lima FML, Latorre MRDO, Costa MJDC, Fisberg RM. Diet and cancer in Northeast Brazil: evaluation of eating habits and food group consumption in relation to breast cancer. CadSaúde Pública, 2008; 24(4): 820-828. https://doi.org/10.1590/S0102-311X2008000400012.

34. Marchioni DML, Fisberg RM, Filho JFDG, Kowalski LP, de Carvalho MB, Abrahão M, et al. Dietary patterns and risk of oral cancer: a case-control study in São Paulo, Brazil. Revista de Saúde Pública, 2007; 41(1): 19-26. https://doi.org/10.1590/S0034-89102007000100004.

35. Azevedo CD, Dal Bosco SM. Perfil nutricional, dietético e qualidade de vida de pacientes em tratamento quimioterápico. ConScientiae Saúde, 2011; 10(1): 23-30. https://doi.org/10.5585/conscientiaesaude/2011/v10n1/2489

36. Sanchéz-Lara K, Sosa-Sanchéz R, Green-Renner D, ET al. Influence of taste disorders on dietary behaviors incancer patients under chemotherapy. Nutr J. 2010; 9(15): 1-6. https://doi.org/10.1186/1475-2891-9-15.

37. Gonçalves T, Carneiro PCPD, Cals PMT, Leão LS, Lima CA, Verde SMML. Qualidade da dieta de mulheres com câncer de mama e sua relação com o conhecimento nutricional e o estado nutricional. RevBrasMastologia, 2012;22(1):13-20. ID: lil-722467

38. International Agency for Research on Cancer. Red meat and processed meat. Lyon, France: IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. 2018. ISBN 978-92-832-0180-9

39. Calabrich A.F.C, Katz A. Deficiência de ferro no paciente com câncer. Rev. Bras. Hematol. Hemoter, 2010; 32(2):95-98. https://doi.org/10.1590/S1516-84842010005000049.

40. Mattes RD, Curram Jr WJ, Alavi J, Powlis W, Whittington R. Clinical implications of learned food aversions in patients with cancer treated with chemotherapy or radiation therapy. Cancer, 1992; 70(1): 192-200. https://doi.org/10.1002/1097-0142(19920701)70:1<192::aid-cncr2820700130>3.0.co;2-g.

Contributors

Pugliesi ACT contributed to the design, data collection and analysis of the results; Caivano AS and Domene SMA contributed to the design and writing; Maniglia FP contributed to the design, writing and final revision.

Conflict of Interest: The authors declare no conflict of interest.

Received: June 22, 2022
Accepted: April 29, 2024