

# Breast cancer engagement peer-led cooking workshop for managing chemotherapy side effects: an experience report

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## ABSTRACT

This experience report describes a consumer-based, peer-led cooking workshop as an adjunct strategy to manage chemotherapy-related side effects in patients with breast cancer, including the development of a recipe e-book. The workshop was conducted at the dietetics laboratory of the School of Nutrition, Universidade Federal de Goiás, Brazil, and facilitated by nutritionists specialized in oncology. Ingredients and preparations with potential to alleviate previously reported side effects were prioritized, including taste alterations, difficulty swallowing, mucositis, weight gain, fluid retention, loss of appetite, nausea, diarrhea, constipation, anemia, and reduced immunity. The acceptability of the preparations was assessed using a hedonic scale and testimonials from participants. Subsequently, an illustrated e-book was developed, detailing preparation methods, portion sizes, nutritional composition, and indications for managing the main side effects experienced during chemotherapy. A total of 14 patients and 6 nutritionists participated in the workshop, and 27 recipes were developed. Participants reported improved knowledge regarding food choices and culinary strategies to manage chemotherapy treatment-related symptoms. Recipes were evaluated by 26 volunteers, and all achieved acceptability scores  $\geq 6$  on the hedonic scale. The e-book was published in 2019 and is freely available online. This initiative contributed to breast cancer patient support and to the dissemination of practical nutritional strategies for managing chemotherapy-related side effects.

**KEYWORDS:** breast neoplasms; dietary guidelines; health promotion; education; engagement; cooking.

## INTRODUCTION

Breast cancer is the most prevalent malignant neoplasm among women worldwide, with an increase of 1% per year over the past decade<sup>1</sup>. In Brazil, an estimated 73,610 cases of breast cancer were projected for 2025<sup>2</sup>. Chemotherapy remains one of the main therapeutic modalities for the treatment of this neoplasm<sup>3</sup>. However, because chemotherapy is a systemic treatment, it is associated with a high occurrence of side effects, many of which directly affect patients' eating and nutritional status. The most frequently reported effects include loss of appetite, dry mouth,

mucositis, odynophagia, dysphagia, vomiting, constipation, diarrhea, and fatigue<sup>4-6</sup>.

Evidence indicates that 80% of breast cancer patients need to modify their diet during chemotherapy<sup>4</sup>. The stress triggered by treatment can act both as a contributing factor to, and a consequence of, experiencing these side effects<sup>7</sup>.

In this context, the nutritionist plays a fundamental role as an educator and disseminator of knowledge about food and nutrition through Food and Nutrition Education strategies<sup>8</sup>. When delivered in groups, these strategies are particularly relevant because

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they allow for reaching a larger number of patients and promote the exchange of experiences among patients and among patients and professionals<sup>9</sup>. Given the side effects of chemotherapy and the importance of delivering patient education, the aim of this article was to report the experience of an extension activity — a peer-led, consumer-centered cooking workshop — as a complementary strategy for managing chemotherapy-related side effects in breast cancer patients, including the publication of an educational e-book with the recipes prepared during the workshop.

## METHODS

### Context

This is an experience report of an extension activity carried out through a cooking workshop and the development of an educational e-book. Data were collected as part of the project “Impact of chemotherapeutic treatment on body composition, lipid and glycemic profiles of women with breast cancer,” approved by the Research Ethics Committee of Hospital das Clínicas at Universidade Federal de Goiás, Brazilian Company of Hospital Services (HREC/HC-UFG/751.387/2014), with studies published elsewhere<sup>10–16</sup>. It was observed that the main side effects of chemotherapy were associated with diet and nutrition.

### Participants

Patients with breast cancer treated at the Centro Avançado de Diagnóstico da Mama of HC-UFG participated in the cooking workshop. They had completed neoadjuvant or adjuvant chemotherapy or were receiving outpatient chemotherapy and were

participants in the umbrella project (HREC/HC-UFG/751.387/2014). Women with metastatic disease (stage IV) or with documented immunocompromise per medical report were not included.

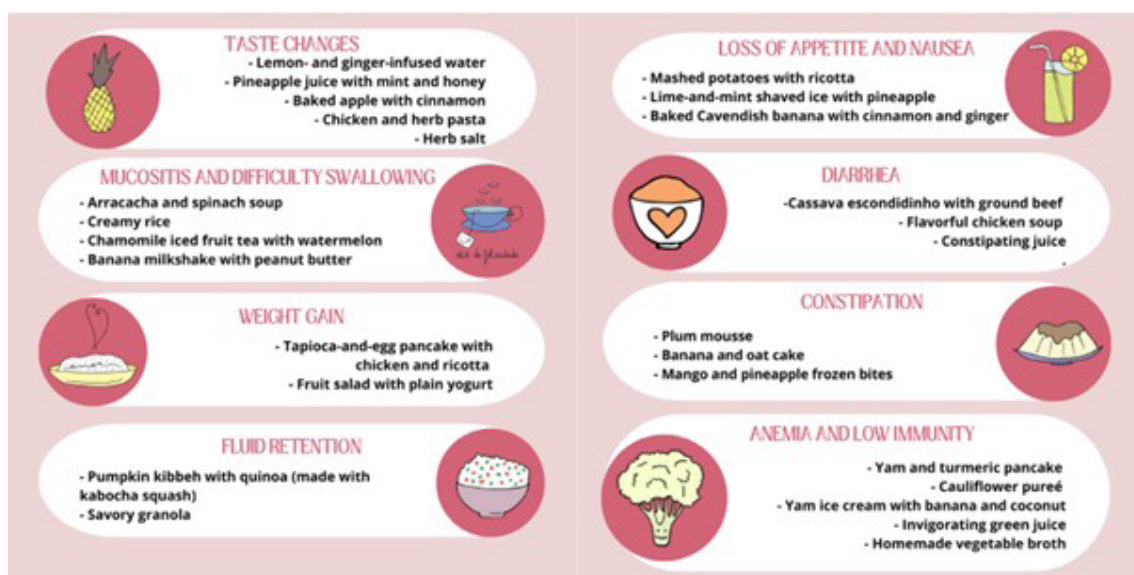
### Intervention

The identified side effects were: taste changes, difficulty swallowing, mucositis, weight gain, fluid retention, loss of appetite, nausea, diarrhea, constipation, anemia, and low immunity. To address these symptoms, 27 recipes were prepared. Figure 1 describes the recipes and their respective side effects. The selected recipes were based on scientific evidence linking specific ingredients and preparations to recommendations for relieving the main side effects during chemotherapy<sup>17–23</sup>. Priority was given to the use of *in natura* or minimally processed foods that are culturally available<sup>24</sup>. The workshop adhered to good food handling practices<sup>25</sup>.

Technical data sheets were used to record the pre-preparation and preparation of the recipes, including preparation and execution time. Ingredients, leftovers, trimmings, and the final preparation were weighed, allowing calculation of total and per-portion yield. Nutritional information per portion was subsequently estimated using the Cookie spreadsheet<sup>26</sup>.

### Assessment

All recipes were tasted and subsequently evaluated for acceptability using the hedonic scale<sup>27</sup>. At the final reception, participants were given the scale rated from 1 to 9 points, indicating the degree of acceptance of the preparation; higher scores correspond to greater acceptability. In addition to the participants, staff members of the institution were also invited to take part in the sensory analysis.



Scientific evidence to support nutritional choices for managing chemotherapy side effects<sup>10–16</sup>.

Source: E-book<sup>29</sup>.

**Figure 1.** Culinary recipes to combat the side effects of chemotherapy. Goiânia, Goiás, 2019.

## RESULTS

The workshop was held on June 7, 2019, in the afternoon, at the Laboratory of Technique and Dietetics of the School of Nutrition at UFG, with a total duration of four hours. Fourteen patients participated, with a mean age of 51 years (standard deviation  $\pm 11.2$ ). Participants were organized into groups of three to four people, accompanied by six nutritionists, at a ratio of one to two professionals per workstation, responsible for supervising the activities. They all received prior training on the laboratory use rules<sup>28</sup>, including the mandatory use of aprons and hair protection.

The activity began with the washing of fruits and vegetables, carried out simultaneously with an explanation of the importance

of microbiologically safe food, especially in the context of immunosuppression resulting from chemotherapy. Each group was responsible for preparing seven recipes, totaling 27 preparations, aiming to help manage 11 chemotherapy side effects. The preparations were designed to be practical, affordable, and nutritionally appropriate, taking into account functional limitations, gastrointestinal symptoms, and other common side effects during oncologic therapy. Ingredients were selected based on scientific evidence, being strategic to help manage these adverse effects. Notable uses include turmeric and ginger in proposed recipes to minimize taste changes, mint leaves to help with loss of appetite and nausea, and dried plums for managing constipation. The list of ingredients is described in Table 1.

**Table 1.** Side effects reported by patients undergoing chemotherapy, corresponding recipes and associated ingredients. Cooking workshop, Goiânia, Goiás, 2019.

Side effect	Recipe	Ingredients
Taste changes	Lemon- and ginger-infused water	Lemon, ginger, mint leaves
	Pineapple juice with mint and honey	Pineapple, ginger, honey, mint leaves
	Baked apple with cinnamon	Apple, lemon, honey, ground cinnamon
	Chicken and herb pasta	Penne pasta, olive oil, salt, bay leaf, chicken breast, Tahiti lime, onion, garlic, parsley, chives, butter, oregano
Loss of appetite and nausea	Herb salt	Dried rosemary, dried parsley, dried basil, dried oregano, salt
	Mashed potatoes with ricotta	Russet potatoes, onion, ricotta, skim milk, unsalted butter, salt
	Lime-and-mint shaved ice with pineapple	Ice, mint leaves, Tahiti lime (Persian lime), pineapple, sugar
	Baked Cavendish banana with cinnamon and ginger	Cavendish banana, Minas cheese, ground cinnamon, ginger
Mucositis and difficulty swallowing	Arracacha and spinach soup	Arracacha (mandioquinha), spinach, onion, olive oil, garlic, rosemary, salt
	Creamy rice	White rice, heavy cream, onion, leek, Italian tomato, peas, garlic, olive oil, parsley
	Chamomile iced fruit tea with watermelon	Chamomile, watermelon
	Banana milkshake with peanut butter	Cavendish banana, whole milk, peanut butter
Diarrhea and constipation	Cassava escondidinho with ground beef	Ground beef, Minas cheese, cooked cassava), ricotta cream, olive oil, garlic, onion, chives, parsley, cilantro, black pepper, salt
	Flavorful chicken soup	Chicken breast, russet potato, white rice, carrot, onion, garlic, olive oil, salt
	Constipating juice	Guava, water, Tahiti lime, honey
	Plum mousse	Dried plums (prunes), sweetened condensed milk, heavy cream, cinnamon stick
	Banana and oat cake	Cavendish banana, egg, oat flour, coconut oil, Brazil nuts, raisins, baking powder
Weight gain and fluid retention	Mango and pineapple frozen bites	Mango, pineapple, natural yogurt
	Tapioca-and-egg pancake with chicken and ricotta	Egg, tapioca starch, chicken breast, ricotta, parsley, chives, salt
	Fruit salad with plain yogurt	Papaya), strawberry, orange, apple, orange juice, plain yogurt, mint leaves
	Pumpkin kibbeh with quinoa (made with kabocha squash)	Kabocha squash, flaked quinoa, onion, parsley, olive oil, oregano, salt
Anemia and low immunity	Savory granola	Rolled oats, sunflower seeds, cashew nuts, Brazil nuts, corn flakes, raisins, flaxseed, sesame seeds, turmeric, sweet paprika, olive oil, salt
	Yam and turmeric pancake	Yam, chicken breast, sweet corn, cream cheese, onion, turmeric, olive oil, salt
	Cauliflower pureé	Cauliflower, whole milk, bay leaf, salt
	Yam ice cream with banana and shredded coconut	Yam, Cavendish banana, unsalted peanuts, shredded coconut
	Invigorating green juice	Orange, chopped ginger and collard greens
Homemade vegetable broth	Onion tomato, carrot, garlic, chives, parsley, salt	

Source: E-book<sup>29</sup>.

The recipes had pre-preparation times ranging from five to 50 minutes, depending on the type of preparation: fresh items, such as mango and pineapple frozen bites; baked, such as baked apple with cinnamon; or those requiring more time and complexity, such as chicken and herb pasta and stuffed kabocha squash kibbeh with quinoa. However, all proposed recipes were applicable in the home context, provided the necessary appliances for their preparation were available. Yields ranged from individual servings to family-sized preparations, predominantly 2 to 6 servings, allowing portioning and safe reuse of meals (Supplementary Table 1).

Regarding nutritional composition, variability was observed in energy value and macronutrient distribution, reflecting adaptation of the recipes to the different side effects of chemotherapy.

Portion energy values ranged from 3 to 532 kcal, with most preparations between 100 and 400 kcal, underscoring the importance of meal fractioning. On average, the recipes contained 26.3 g of carbohydrates, 8.0 g of protein, and 7.4 g of fat per portion. Among lipid sources, there was a low contribution of saturated fats and a minimal presence of trans fats (Table 2). The preparations were structured to contribute to food intake, taking into account specific side effects and, above all, the need for energy balance and foods better tolerated in contexts of loss of appetite, nausea, taste changes, and gastrointestinal discomfort. All recipes, ingredients, pre-preparation information, yields, nutritional and supplementary information are available in the e-book<sup>29</sup> accessible via the QR code shown in Figure 2.

**Table 2.** Nutritional information of the recipes developed to help manage side effects during chemotherapy treatment. Culinary workshop, Goiânia, Goiás, 2019.

Recipe	Nutritional information					
	Energy (kcal)	Carbohydrate (g)	Protein (g)	Lipid (g)	Saturated fat (g)	Trans fat (g)
Lemon- and ginger-infused water	3.0	0.5	0.1	0.04	0.0	0.0
Pineapple juice with mint and honey	105.0	25.3	0.7	0.3	0.0	0.0
Baked apple with cinnamon	137.0	35.8	0.3	0.5	0.1	0.0
Chicken and herb pasta	322.0	20.6	23.0	16.0	5.5	0.1
Herb salt	7.0	1.5	0.4	0.2	0.0	0.0
Mashed potatoes with ricotta	405.0	48.8	14.1	17.8	11.1	0.5
Lime-and-mint shaved ice with pineapple	102.0	24.7	0.8	0.3	0.0	0.0
Baked Cavendish banana with cinnamon and ginger	229.0	27.3	10.2	10.1	5.9	0.0
Arracacha and spinach soup	165.0	32.7	3.0	3.2	0.4	0.0
Creamy rice	402.0	64.6	9.1	11.8	5.9	0.0
Chamomile iced fruit tea with watermelon	86.0	21.4	1.7	0.3	0.0	0.0
Banana milkshake with peanut butter	228.0	27.9	8.2	9.9	4.0	0.3
Cassava escondidinho with ground beef	375.0	26.7	33.8	14.4	7.0	0.3
Flavorful chicken soup	156.0	14.6	11.9	5.3	1.4	0.0
Constipating juice	81.0	20.1	0.9	0.6	0.2	0.0
Plum mousse	532.0	59.4	12.4	28.3	12.9	0.2
Banana and oat cake	246.0	30.7	5.7	12.4	4.7	0.0
Mango and pineapple frozen bites	188.0	37.7	4.0	3.3	1.9	0.1
Tapioca-and-egg pancake with chicken and ricotta	358.0	12.3	27.3	21.7	7.4	0.1
Fruit salad with plain yogurt	104.0	16.6	3.9	3.2	1.8	0.1
Pumpkin kibbeh with quinoa (made with kabocha squash)	215.0	21.9	6.8	11.9	1.4	0.0
Savory granola	197.0	20.1	4.9	11.7	2.0	0.0
Yam and turmeric pancake	389.0	50.7	22.7	10.5	4.2	0.2
Cauliflower pureé	56.0	5.8	3.2	2.6	1.6	0.1
Yam ice cream with banana and shredded coconut	131.0	26.0	2.2	2.7	1.3	0.0
Invigorating green juice	125.0	28.5	2.4	0.7	0.1	0.0
Homemade vegetable broth	35.0	7.9	1.1	0.3	0.0	0.0

Source: *E-book*<sup>29</sup>.

The developed preparations were tasted by 26 volunteers, including patients, nutritionists, and external guests, and showed high acceptability, with 100% of the recipes receiving a score  $\geq 6$  on the hedonic scale.

The development of the cooking workshop provided a space for exchanging knowledge, experiences, and addressing questions related to eating during chemotherapy. The principles of the Food Guide for the Brazilian Population<sup>24</sup> were used to guide the discussion and promote alignment with healthy eating practices throughout treatment. The activity revealed relevant aspects of the participants' experiences, such as the adoption of overly restrictive eating practices, receiving nutritional recommendations without professional follow-up, and perceiving a negative impact on quality of life. This moment proved particularly significant, allowing patients to share concerns, experiences, and coping strategies in a welcoming and safe environment<sup>8</sup>.

The e-book (Figure 2) was officially launched during the opening of the October Pink 2019 campaign, in the auditorium of the Associação de Combate ao Câncer no Estado de Goiás, Hospital Araújo Jorge, in Goiânia (GO). The material titled, in Portuguese, "*Temperos da vida: como os sabores cuidam e conectam – um mini manual de como a comida pode auxiliar no tratamento*

*do câncer de mama*" (in English, "Spices of Life: How Flavors Care and Connect – A Mini Guide on How Food Can Aid Breast Cancer Treatment")<sup>29</sup> aimed to convey knowledge in a simple, practical, and didactic way, to train and empower women undergoing chemotherapy as well as their caregivers. The content was structured to address the concept of breast cancer, treatment modalities, possible side effects, and guidance for healthy eating throughout this process. It also included recommendations on washing fruits and vegetables, illustrations of household measures used in Brazilian cooking, the developed recipes with their nutritional composition per portion, as well as testimonials and acknowledgments.

It is noteworthy that the e-book underwent editorial and visual review and featured original illustrations created by a professional designer. The authors were invited to present the conception and content of the material in interviews, events hosted by oncology institutions, educational institutions, and discussion circles in different regions of Brazil. The e-book has been recommended by oncologists and other health professionals, used as reference material in Food and Nutrition Education activities, and cited in other works. Additionally, the recipes were replicated and filmed for dissemination on the social media channels of the Brazilian Society of Mastology<sup>30</sup>.



Source: *E-book* available at the Brazilian Society of Mastology website.

**Figure 2.** Representative cover and e-book access. Goiânia, Goiás, 2019.

## DISCUSSION

Carrying out extension activities is an important step to provide appropriate guidance in response to demands identified during research activities, strengthening the research-teaching-extension axis. In this sense, the proposed activity fulfilled its role, in addition to promoting equity in access to information in a safe and welcoming environment. It was possible to test recipes aimed at managing the main side effects reported by the patients, as well as to offer guidance focused on improving food intake during this phase of treatment. Moreover, questions related to food and nutrition were carefully and individually addressed by the team of nutritionists. The development and dissemination of the e-book expanded the reach of the generated knowledge, extending beyond the local community (micro) and reaching society more broadly (macro).

Studies in other Brazilian states show that breast cancer patients and survivors have excessive intake of calories, saturated fats, sodium, sugars, and ultra-processed foods<sup>31-33</sup>. In Goiás, a similar dietary profile was observed<sup>16</sup>. This consumption pattern, in addition to negatively impacting overall health status and weight control, is associated with worsening of treatment-related side effects, including metabolic alterations, fatigue, gastrointestinal symptoms, and reduced tolerance to therapies. These findings reinforce the need for early and continuous nutritional interventions aimed at this population<sup>17,23</sup>.

The adoption of an appropriate diet during cancer treatment has been recommended internationally<sup>34</sup>. In the Brazilian

context, such guidance can be based on the Food Guide for the Brazilian Population, which advocates valuing traditional foods, with a preference for *in natura* or minimally processed foods and their culinary preparations<sup>24</sup>. Although the guide is a valuable tool for promoting healthy eating habits, not all of its principles can be applied directly to patients with specific clinical conditions, and adaptations are required according to the pathophysiology of each case. Thus, individualized nutritional management becomes essential in the context of breast cancer and should be supported by the Brazilian Consensus on Oncology Nutrition<sup>17</sup>.

The side effects of chemotherapy represent a significant challenge, especially because antineoplastic drugs affect taste sensory cells, reducing food acceptance both qualitatively and quantitatively and increasing preference for sweet and fatty foods, as evidenced in the literature<sup>35</sup>. Additionally, symptoms such as mucositis, dysphagia and/or odynophagia, constipation, and diarrhea worsen eating difficulties, further compromising patients' food intake and nutritional status<sup>4-6</sup>.

For the management of diarrhea, foods with constipating effects that are non-irritating to the intestinal mucosa were prioritized, while for constipation preparations with laxative action were chosen<sup>23</sup>. In situations of reduced immunity, turmeric was included due to its anti-inflammatory properties<sup>19,20</sup>. To relieve mucositis, preparations such as a healthy milkshake and chamomile tea were used, considering their analgesic and healing properties<sup>21,22</sup>.

In line with previously conducted supervised cooking workshops with cancer patients, the experience provided to the patients helped promote dietary knowledge and the applicability of the recipes in daily life<sup>36,37</sup>. Appropriate nutritional strategies can help reduce side effects during chemotherapy. The proposed preparations promote a more varied, flavorful, nutritionally adequate, and healthy diet throughout life.

The activity has some limitations, such as the sample size, which consisted of volunteers selected by convenience, potentially introducing selection bias. In addition, the cooking workshop was held in a single session, reflecting the absence of longitudinal follow-up and precluding assessment of sustained effects over time. These aspects limit the generalizability of the results to other populations and care settings.

Among the strengths, it is noteworthy that the extension activity was designed based on demands identified in a research project, fostering integration between academic production and extension practice. This approach contributed to returning scientific knowledge to the target population. The intervention was grounded in guidelines and the consensus for nutritional care of oncology patients<sup>17</sup>, as well as in the principles of the Food Guide for the Brazilian Population<sup>24</sup>, ensuring an evidence-based, culturally accessible approach adapted to the particularities imposed by treatment side

effects. Thus, the practical applicability of nutritional guidance in the real care context is reinforced.

## CONCLUSION

The extension activity supported patients and promoted the dissemination of knowledge on food and nutrition for managing chemotherapy side effects, providing practical, scientifically grounded information to address the challenges posed by treatment.

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## AUTHORS' CONTRIBUTIONS

LVG: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing. JCMGM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing. LCVR: Visualization, Writing – original draft, Writing – review & editing. RFJ: Supervision, Validation, Visualization, Writing – review & editing. KAM: Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing.

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**Supplementary material:** [https://drive.google.com/file/d/1LJ4VLN0h\\_YXpzVfWAlsw7l6oPsYODre8/view?usp=drive\\_link](https://drive.google.com/file/d/1LJ4VLN0h_YXpzVfWAlsw7l6oPsYODre8/view?usp=drive_link)

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