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Brief Title: Improving Lifestyle Behavior by "Joven, Fuerte y Saludable" Multidisciplinary Program. Official Title: Efecto de Una intervención Multidisciplinaria de Estilo de Vida Sobre el Exposoma de Pacientes premenopáusicas Con cáncer de Mama Estadios I-III.

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Abstract

Background. Breast cancer (BC) is the leading cause of cancer-related death and disability in young women. Patients with BC experience physical symptoms and psychosocial distress that adversely affect their quality of life (QoL), physical functioning, and psychological well-being. “Joven & Fuerte" is a navigation program for young women with BC at the National Cancer Institute in Mexico City. The program proposes an hybrid model (face-to-face and virtual) to support patients on aspects such as oncology, nutrition literacy, and psychology with mindfulness. **Methods.** The study was initially planned as a randomized controlled trial to ensure accurate results. However, during the pilot study, it was adapted to meet the specific needs of patients such as oncology consultations and in consideration of living arrangements. Two groups will be compared: one receives hybrid education and the other, a hybrid education and personalized intervention. Patients who agreed for the face-to-face sessions were assigned to the personalized interventions group, and others, to the hybrid education group. The intervention group receives an in-person consultation to evaluate their physical measurements and an interdisciplinary assessment by experts. Patients can ask for virtual assistance through Zoom and WhatsApp in case of any issues during the intervention. In addition, educational materials such as healthy lifestyle guides and videos can be accessed through Facebook and YouTube groups upon request. To ensure the comprehension of the material, follow-up sessions are conducted through phone calls, video calls, or on-site visits. Validated questionnaires will assess lifestyle habits, QoL status, and levels of distress, anxiety, and depression.

What is already known on this topic

- Breast cancer and its treatment impacts the lifestyle and quality of life of patients.
- Improvement in nutrition, lifestyle, and psychological wellbeing positively impacts the prognosis of breast cancer and quality of life or survivors.

What this study adds

- Provides interventions for patients living far from a hospital.
- Evaluates the health advantages of educational and personalized interventions.

- Examines how lifestyle changes affect the quality of life, mental health, and physical functioning of patients with breast cancer receiving cancer treatment.

How this study might affect research, practice, or policy

- This hybrid approach is both viable and economical for public institutions.
- The findings of this study will reveal the effects of these interventions and their potential benefits to patients.

INTRODUCTION

Breast cancer (BC) is a leading cause of death in women worldwide, especially in Latin America, where patients often present with advanced stages of aggressive subtypes of BC at a younger age (1). The risk of BC depends on various factors, including hormone replacement therapy history, reproductive history, alcohol or tobacco consumption, physical activity, and dietary habits, that are collectively called exposome (2). Exposome refers to the exposure to environmental influences and biological responses throughout a person's life from the prenatal stage. It can be influenced by the environment, diet, behavior, and endogenous processes (3).

External exposome refers to environmental factors such as mental stress, climate, and lifestyle. In contrast, internal exposome are changes within an organism such as increased stress hormones, inflammatory cytokines, and oxidative stress (4). Constant exposure to environmental factors, such as an unhealthy lifestyle, can cause cellular damage and contribute to the growth and evolution of tumors. Once cellular damage occurs, internal exposome promotes changes that create a harmful environment, favoring cancer cells to acquire mechanisms to cope with stress and drugs, leading to a resistance to oncological treatments (5).

Obesity is part of the personal exposome and can impact the internal exposome, potentially affecting BC patients. A significant percentage of patients diagnosed with BC (70.9%) are overweight or obese at the time of diagnosis (6). This weight gain usually occurs during systemic treatment, with 25% of patients gaining weight within six months, 32% between 6-12 months, and 20% between 12-18 months after diagnosis (7). Young women with breast cancer (YWBC) also experience and increase in weight since the initiation of oncological treatment and up to the second year of diagnosis (from 39% at baseline to 46% in two years), highlighting the importance of evaluating the implications of weight gain and whether early intervention would help control the risk factors mentioned earlier (8). Obesity may also be associated with worse disease-free and overall survival (9).

Weight gain in patients with BC is often associated with several factors, including systemic treatment, diagnosis at a young age, and lifestyle changes resulting from the disease or treatment. However, the primary mechanism underlying weight gain is reduced physical activity (10). The combination of chemotherapy and endocrine therapy is linked to higher weight gain, especially in patients who are premenopausal (a gain of up to 24 kg). In contrast, those who are postmenopausal tend to lose weight (11).

BC patients have reported experiencing physical symptoms and psychological distress, which can negatively impact their quality of life (QoL). These symptoms can affect their physical functioning, psychological well-being, and social support levels (12). Particularly, YWBC is a vulnerable population with specific concerns such as fertility, self-image, QoL, sexuality, and personal goals (13) and experience high anxiety and depression (14). Maintaining a healthy lifestyle can improve QoL and lead to better prognoses and lower mortality rates (15). For example, exercise can reduce breast cancer-related death risk by 30% and all-cause death risk by 41% (16). Patients undergoing oncology treatment face various nutritional challenges that differ based on the type and stage of cancer, and the treatments may worsen these challenges. Early nutritional screening and interventions are crucial in the cancer population, as emphasized in the clinical guidelines (ASPEN/ESPEN) (17).

The Instituto Nacional de Cancerología (INCAN) in Mexico City offers a program called "Joven & Fuerte" for young women diagnosed with BC. However, the attention was not systematic and it was difficult to measure the benefits of the intervention. So the present study proposes a psychological intervention, side effect management, physical activity, sleep hygiene, and psychological strategies, with onsite and remote interventions to improve patient adherence and ensure timely attention. The study aims to evaluate the impact of early intervention on metabolic control in newly diagnosed BC patients, their QoL, and clinical outcomes.

METHODS

A controlled trial design was adopted in which patients were assigned to two intervention groups according to the nutritional, psychological, or rehabilitation risk at baseline or according to their geographical localization. The first group will receive a hybrid multidisciplinary lifestyle education intervention, whereas the second group will receive an individualized hybrid multidisciplinary lifestyle intervention.

For sample size estimation, we used internal statistics from the Mammary Tumor Department at the INCAN, which has an annual average of 109 women diagnosed and treated based on the selection criteria. Considering the effect on metabolic and inflammatory parameters, a study by Dieli-Conwright et al. (18) was followed to

identify the difference in the decrease in insulin parameters by 14%. A confidence level of 95% and power of 80% were considered with a control: intervention ratio of 1:1. Thus, a sample size of 132 patients was obtained. Considering a probable loss of 10%, 146 patients were invited to participate in the study, with 73 patients per group.

Inclusion criteria

- Women aged ≥18 and <40 years who were diagnosed with stage I-III BC, confirmed by pathology and image at the INCAN
- Candidates for multidisciplinary treatment, including surgery, chemotherapy, and/or hormonal treatments.
- Signed the informed consent form
- Have access to a mobile phone or any electronic device with an active internet connection to receive the program information.

Exclusion criteria

- Patients with inflammatory cancer
- Those with cardiomyopathy or ventricular dysfunction (NYHA >II), arrhythmia secondary to left ventricular ejection alterations that require medication, previous myocardial infarction, or angina pectoris in the last six months
- Receiving treatment for cardiovascular or cerebrovascular disease, inflammatory bowel disease, malabsorption syndrome, rheumatoid arthritis, lupus, thyroid diseases, or Cushing syndrome
- Unable to walk for at least 1 km
- Have cardiovascular, respiratory, or musculoskeletal diseases that impede physical activity
- Pregnant or breastfeeding
- Have psychiatric conditions impeding active participation in this protocol
- Do not understand Spanish

Selection and group assignment of the patients

Patients will be recruited through an active program at the INCAN, where potential candidates will be identified and invited by the navigator at the program “Joven & Fuerte.” After they sign the informed consent form (ICF), patients will be assigned into one of the two groups:

Group 1: Hybrid multidisciplinary lifestyle education intervention.

Group 2: Individualized hybrid multidisciplinary lifestyle interventions.

The initial proposal was randomized assignment to each group; however, the pilot study revealed challenges for patients who lived far from the hospital, in other states, or had personal obligations such as family or work. Therefore, the randomization process was adapted to meet the patients' needs. The intervention aims to facilitate patients' adherence and follow-up with healthcare providers. Additionally, patient preferences were considered when assigning them to a group.

Intervention

The individualized hybrid multidisciplinary lifestyle intervention consists of four phases. During the **initial phase**, (1st month), patients undergo psychological, nutritional, and physical evaluations using validated questionnaires. Weekly follow-ups are scheduled to answer any questions and provide educational materials. Psychological intervention for the management of stress, anxiety, or other sleep disorders begins during this phase. Changes in diet and physical activity levels are prepared based on baseline questionnaires and adjusted to their needs and preferences to facilitate adherence to the intervention. Basic nutritional orientation is provided covering topics such as identification of food groups using guides such as "My Plate" (19) from the American Association of Diabetes, how to read nutrition facts labels, and explanation on following a healthy diet, with available food groups in the country.

In the **consolidation phase**, from second to sixth month, patients undergo follow-ups every two weeks on-site or remotely, depending on the patient's preference. Follow-up was to monitor patients' symptoms and adjust their diet and exercise routines accordingly. Psychological intervention will be tailored to individual needs if a patient experiences symptoms such as nausea, vomiting, diarrhea, or fatigue. This phase aims to help patients become independent and manage their activities without professional help. A personalized diet and exercise plan will be created for each patient, considering their socioeconomic status. The local food groups available to each patient are prescribed. The Avena Health application will monitor water consumption, physical activity, and nutritional adherence if the patient has access.

The **maintenance phase**, from seventh to 12th month, the patients will be followed up every two months. Anthropometric measures, blood tests, and questionnaires will be used to assess their progress. The objective of this phase is to reinforce the recommendations of previous phases.

The patients undergo check-ins every three months during the follow-up phase, which begins after 12 months. In the medium term, anthropometric measures and

questionnaires will be used to evaluate patient adherence to multidisciplinary interventions. Any questions or concerns will be addressed during the checks. See **Figure 1.**

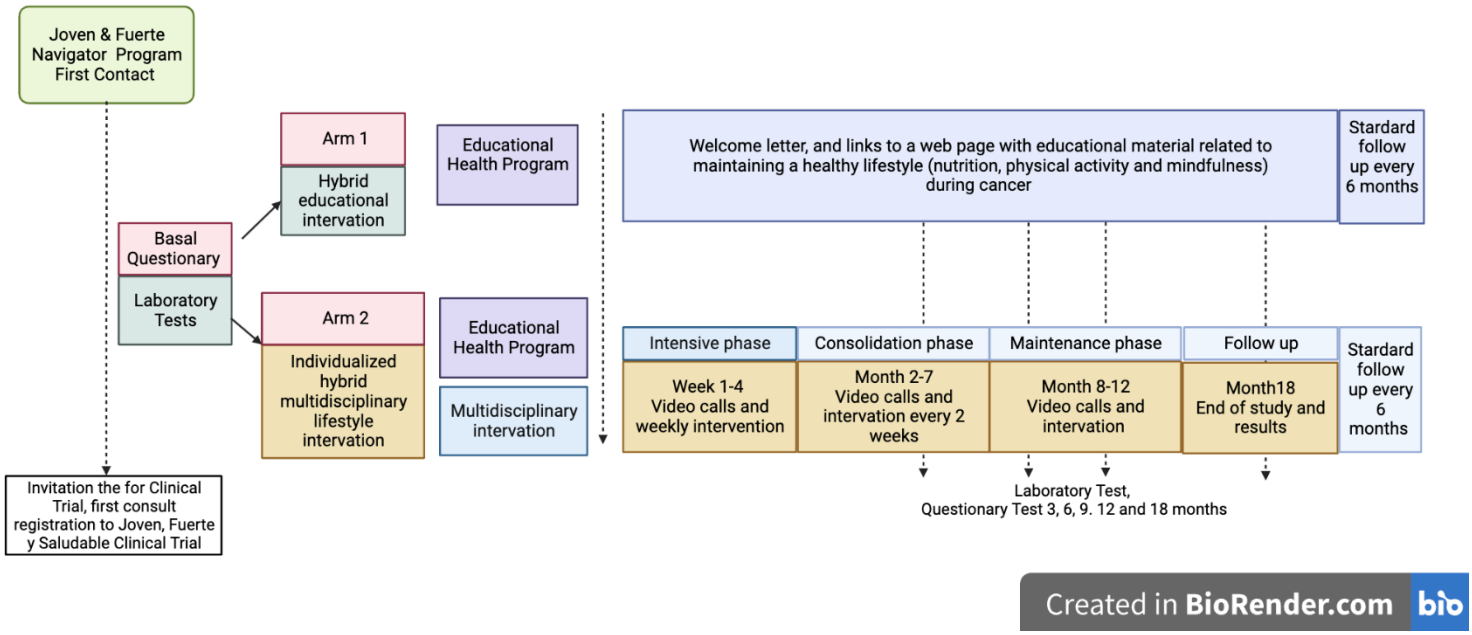

Figure 1. Joven, Fuerte y Saludable, Protocol Design.

Components of the Multidisciplinary Individualized Intervention

Nutritional Intervention

Patients will undergo a comprehensive nutritional assessment and receive guidance on maintaining a healthy diet balanced with macronutrients. Assessment of symptoms that affect nutritional or metabolic status; anthropometric indicators such as weight, height, waist circumference, arm circumference, waist-to-hip ratio, and body composition determined by bioelectrical impedance analysis (BIA) will be collected at baseline and follow-up; and biochemical parameters such as blood glucose, insulin, HbA1c, total, low-density lipoprotein-cholesterol, high-density lipoprotein-cholesterol, triglycerides, and c-reactive protein (CRP) will be assessed. Recommendations will be tailored to the individual's needs and budget and any adverse effects related to their cancer treatment, focusing on a healthy, moderately hypocaloric diet (for those who are overweight, obese, or at metabolic risk) or an isocaloric diet for those who are underweight, considering the individualized requirements of energy, protein, carbohydrate, lipids, vitamins, and minerals. Dietetic assessment measures adherence to the diet prescription through a typical

feeding model or 24-hour recall. Participants will meet the program nutritionist according to the visit frequency described for each phase.

A webpage will be available with weekly modules on nutrition, and patients will be invited to workshops to resolve any obstacles they encounter while implementing recommendations. A virtual class would be offered if someone could not attend the workshop. A workbook with educational information and a diary section will also be provided, allowing patients to share their thoughts on the intervention, challenges they face, and questions.

Physical activity intervention

Patients will be prescribed a customized regimen of dynamic aerobic exercise to improve their physical capacity. A stress test determines maximum effort capacity and identifies contraindications. The rehabilitation team will evaluate the performance status of patients using the Karnofsky Index (a functional scale) and Eastern Cooperative Oncology Group (ECOG). Patients receive personalized treatment based on their diagnoses. In addition, they will receive a digital or physical guide of exercises appropriate for their disease stage. They should perform these exercises 3-5 times weekly for at least 150 minutes, including resistance training and moderate-intensity aerobics. Patients with special needs, such as those with lymphedema, post-surgery, or active treatment, can also undergo various exercises. A healthcare professional trained in oncological rehabilitation will supervise all the exercise sessions.

Psychological intervention

During the diagnosis and treatment of BC, workshops will be held in collaboration with a psychology team to assess the emotional symptoms. Patients will receive videos of relaxation techniques and their anxiety levels will be monitored using a thermometer anxiety tool. _Patients who score more than four will complete depressive and anxiety symptom questionnaires (the Patient Health Questionnaire, PHQ-9 and Generalized Anxiety Disorder, GAD-7, respectively) and will be referred for group or individual therapy. The number of therapy sessions will be limited to eight for individual interventions and two for each multidisciplinary intervention phase. The questionnaires will be administered at the beginning and at three, six, nine, and 12 months.

Psychological interventions will involve cognitive-behavioral therapy, which will focus on changing cognition and behaviors to reduce symptoms of stress, anxiety, and depression. Treatment will also address the emotional discomfort caused by the diagnosis and treatment and its impact on family and couple dynamics, social and

work life, body image, sexuality, and fertility etc. During the sessions, a clinical history will be taken, with which a Clinical Map of Pathogenesis and Goal Scope Map will be generated according to the Nezú and Nezú model (4). This assessment allows the development of a therapy focused on the patient's needs and, to identify intervention strategies for achieving specific goals, such as psychoeducation, relaxation training, cognitive restructuring, problem-solving therapy, behavioral activation, and assertive communication training. Patients can choose between hybrid formats such as Zoom and WhatsApp and onsite sessions with specialists.

Mindfulness + oncologic rehabilitation intervention

The oncological rehabilitation and mindfulness program consists of four modalities:

- Group face-to-face,
- Individuals face-to-face
- Group online, and
- Individual online

The program can be applied at different time points during patient treatment: before, after, and after surgery with chemotherapy and/or radiotherapy.

Physical exercises include different activity levels for patients to improve their flexibility, range of motion, strength, and recovery capacity; exercises included in the program are aimed at working different parts of the body, combined into different techniques divided into static, moving, breathing, and meditation techniques, and Thai-Chi and Qi Gong, as part of the mindfulness program. The contents of the program are presented in **Table 1.**

Table 1. Mindfulness and oncologic rehabilitation content

PROGRAM ADMISSION	ONCOLOGIC REHABILITATION	EXERCISES	MOVEMENT TECHNIQUES	STATIC TECHNIQUES	BREATHING TECHNIQUES	MEDITATION TECHNIQUES	EDUCATIONAL MATERIAL
Interview **(E)**	Flexibility **(RFi)**	Neck **(C)**	Expansion and contraction **(ECS)**	Body scan (on the floor) **(EA)**	Conscious breathing **(RCS)**	Static meditation **(ME)**	Welcome to the program! **(BVP)**
Initial evaluation **(EI)**	Range of movement **(RRM.ii)**	Upper limbs **(MS)**	Expansion and contraction on the wall **(ECP)**	Body scan (seated) **(ES)**	Conscious breathing (5 words) **(RCS5)**	Static meditation (seated) **(MES)**	Benefits of oncologic rehabilitation **(BFRO)**

Questionnaire application **(AC)**	Strength **(Rfza. III)**	Lower limbs **(MI)**	21 movements **(21M)**	Internal circulation channel **(CIC)**	Breathing awareness (chest, costal, abdominal) **(RAWS)**	Lay down meditation **(MA)**	Benefits of mindfulness **(BFAP)**
Postural hygiene **(HP)**	Recovery **(RR.IV)**	Legs **(P)**	Tai Chi's 13 movements **(13M)**		Abdominal breathing **(RA)**	Walking meditation **(MC)**	Stress consequences **(CSCE)**
Integration of the program **(IP)**		Thorax **(T)**	5 animals (Qi Gong) **(5A)**		Breath count **(CR)**	Moving meditation **(MCM)**	Cortisol **(CZ)**
Psychological intervention **(IPS)**		Hip **(H)**					Sixth sense **(SS)**
							Nutrition **(NT)**

*****Codes used in this intervention are marked in bold and in parentheses.

Finally, sessions will be completed by ensuring that the patients are aware of the importance of how stress impacts health, reminding them that specific at-home exercise techniques could improve their physical condition.

Educative intervention

Psychologic and mindfulness educative intervention

Virtual educational intervention was adjusted to STREAM intervention for BC after adapting it for our population (20). Based on our experience with the Joven & Fuerte program this intervention with continue for 10 weeks, from the beginning of the diagnosis, which, is when the patient requires understanding and assimilating their diagnosis and the life changes that cancer treatments will represent, as well as adapt to the institution. This intervention intends to manage the emotional stress of this phase in collaboration with the psychology and mindfulness team.

Questionnaires will be administered to evaluate QoL (QLQ-C30 and QLQ-BR23) at the baseline and at three, six, 12, and 18 months, and healthy lifestyle (WCFR/AICR) at the beginning and end of the intervention in both groups.

While these activities are performed, patients will participate in a mindfulness workshop for 10 weeks, which includes breathing counting techniques (Zazen), guided meditations (five words of self-composure), meditation exercises with static movement (BaDuanJin), conscious walking (Kinjun), body scan, energy concentration work and physical movement (five healing animals), moving meditation (TaiChi), and yoga. All of these techniques are intended to be tools for the patient to deal with the stress she faces during her BC diagnosis.

Healthy lifestyle educative intervention

The healthy lifestyle education intervention was adapted from the Diabetes Prevention Program (DPP)(21) funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and has been used in BC studies, such as SUCCESS (22), MEDEA (23), and PASAPAS (24). This educational material is planned to be given to all intervention groups. Every week, in a hybrid format, patients will receive a WhatsApp or, through the Facebook group, the written information, video, and/or audio of the subjects included in the program. Additionally, patients will receive a manual with a weekly description of the topic to be discussed and the activities they must carry out that week in a way that the patient will have the whole week to carry out her activities; on Friday, a session will be opened both on Zoom or WhatsApp, or in the case of patients who can physically go to the institute in person. The expert will also be available so that the patient can share her doubts and difficulties faced during the week.

On **Table 2**, educational subjects reviewed on every intervention phase are described.

Intervention phase	Follow-up	Week	Title	Content
Intensive phase: weekly follow-up	1	1	Welcome to the program	Introduction
	2	2	Caloric balance	Caloric restriction
	3	3	Type of fatty acids	Caloric restriction
	4	4	Reducing calories, controlling portions	Caloric restriction

	5	5	Muscular movement	Physical activity
	6	6	Working with your surroundings	Behavioral support
	7	7	Problem-solving	Behavioral support
	8	8	Being active: a way of living	Physical activity
	9	9	Healthy eating	Caloric restriction
	10	10	Healthy eating and breast cancer	Breast cancer and nutrition
	11	11	Preparing a better breakfast, lunch, and dinner	Caloric restriction and behavioral support
	12	12	Progress review	Recap and evaluation
Consolidation phase: two-week follow-up	13	14	Answering negative thoughts	Behavioral support
	14	16	The slope in changing to a healthy lifestyle	Behavioral support
	15	18	Intensifying physical activity	Physical activity
	16	20	10 ways to control hunger	Behavioral support
	17	22	What to eat on holidays	Behavioral support
	18	24	Making balance and celebrating success	Recap and evaluation
	19	28	How to stay motivated	Behavioral support

Maintenance phase: monthly follow-up	20	32	Recovering from excess eating	Behavioral support
	21	36	Weight loss review	Caloric restriction
	22	40	How to adapt to long-lasting success	Behavioral support
	23	44	Preparing for what's yet to come	Recap and evaluation
	24	48	Congratulations! You finished the program!	Recap and evaluation

Table 2. Intervention phases adapted from the diabetes education program (DPP)

Barriers and facilitators for the multidisciplinary program implementation

As this program is being implemented for the first time and with the aim of enhancing patient care, the assessment of barriers will be carried out through questionnaires administered to both program staff and enrolled patients. The purpose is to identify the barriers faced by each party, thereby enabling the provision of solutions alongside the interventions. The questionnaire design was based on the CFIR/RE-AIM framework, a tool used to assess the success of program implementation (25, 26).

Data analysis

Descriptive statistics will be performed for the clinical and demographic data. Inferential comparisons will be made by calculating the relative risk with 95% confidence intervals. To compare the effect between groups, a statistical comparison with the Kolmogorov-Smirnov test will be performed, and depending on the distribution of data, parametric (normal distribution) or non-parametric (non-normal distribution) tests will be applied. To evaluate the differences between groups, Student's T test for related groups or the Mann-Whitney test will be used, while for the analysis of repeated samples, analysis of variance (ANOVA) will be used for three or more variables, depending on the nature of the data.

Chi-square and Fisher's tests will be used to compare categorical variables, and the alpha value will be set to 0.05. Bivariate analysis will be performed to identify differences between groups and associations with survival concerning the measured

clinical variables and biomarkers. To analyze the existing correlation with the clinical variables, Pearson or Spearman regression with a 95% confidence interval will be used, depending on the nature of the data distribution. To determine the associations between independent variables, multivariate logistic regression models were used, adjusting for the remaining clinical variables.

Discussion

Although various interventions provide nutritional and physical activity counseling, most of them are focused on patients who have survived cancer and do not include those who have been diagnosed recently. Emotional support is also not taken into account. A recent meta-analysis published by Cochrane reviewed 20 studies and involved 2028 patients with breast cancer who received interventions for weight loss. The results showed that these interventions for survivors of breast cancer with obesity resulted in moderate weight reduction, improved body mass index and waist circumference, and enhanced quality of life through diet and exercise interventions (7). It appears that a multidisciplinary approach could lead to even better results, and probably it has to be since the diagnosis to start a mentality switch since the beginning of the disease.

Nutritional interventions in patients with cancer ensure adequate intake of energy and nutrients during oncological treatment, which results in an improved response and reduced toxicity of pharmacological anti-cancer therapies. These health changes reduce the long-term side effects of treatment and promote long-term overall health (27). The Women's Intervention Nutrition Study (WINS) demonstrated the impact of nutritional intervention on the prognosis and survival of BC, with a low-fat diet promoting modest weight loss, improving metabolic biomarkers, and positively affecting disease-free survival (28). According to lifestyle guidelines recommended by the World Cancer Research Fund (WCRF)/American Institute for Cancer Research (AICR), a fiber- and soy-rich diet and limited consumption of fatty acids (especially saturated fatty acids) can improve survival after BC diagnosis (27).

According to research by Demark-Wahnefried et al., women undergoing chemotherapy may experience a decrease in energy expenditure due to reduced activity despite same calorie intake (29). The Health, Eating, Activity, and Lifestyle (HEAL) study also found that patients who engaged in less exercise and physical activity had a higher risk of weight gain. Patients who underwent chemotherapy experienced a more significant decrease in exercise time (3.6 hours per week) than those who underwent surgery (1.6 hours per week). Furthermore, a study showed that all patients who underwent chemotherapy experienced amenorrhea; therefore, changes in hormones and menopause could impact metabolism, affecting body

composition and the waist-to-hip ratio. This can result in increased estrogen and insulin levels (30).

Oncological rehabilitation (OR) and mindfulness stimulate specific neurovascular terminals that activate ATP, improve bloodstream flow, and stimulate the parasympathetic nervous system (PNS), thereby generating serotonin and endorphins, relaxing muscles, improving digestion, and reducing insomnia. It also prevents sarcopenia and stimulates immunoglobulins and the osteomioarticular system (OMAS). Mindfulness provides a profound knowledge of the mind and its discriminative processes, allowing free radicals to be dosed. Through extensive practice, the patient learns how to regulate their attention and manages to focus on the present, which enhances the experience itself and the exercises at hand (31).

Psychological treatments for patients with BC indicated that cognitive behavioral and psycho-educational therapies have a significant positive impact. These therapies improved QoL, reduced anxiety and depression, and improved mood. The study found that treatment lasting between six and twelve weeks achieved better psychological results than shorter or longer interventions (32). Relaxation techniques are commonly used in mindfulness programs and psychological interventions to alleviate symptoms of depression, anxiety, stress, and fear of recurrence. Survivors of BC have reported improved sleep quality after practicing these techniques. (33). Cognitive-behavioral approaches have successfully overcome fatigue and improved sleep quality. (34). A randomized trial conducted by Rogers et al. revealed that physical activity positively impacted overall sleep quality compared to usual care in BC patients. (35).

Patients with BC have benefitted from virtual psychological interventions. One study called the Web-Based Stress Management for Newly Diagnosed Patients with Cancer (STREAM) developed an online stress management program that significantly improved the QoL for patients in the intervention group (73.2%) compared to the control group (59%). The Hospital Anxiety and Depression scale (HADS) score decreased, mainly due to reduced levels of distress (20). Another study used a web-based psychological intervention called Web-Based Self-Management for Psychological Adjustment After Primary Breast Cancer (BREATH), which resulted in lower levels of distress (84%) and clinical deterioration (16%) for the intervention group (36).

Conclusion

Although there have been several studies on interventions for breast cancer patients, such as those related to nutrition, physical activity, mindfulness, or psychological support, these interventions have typically been conducted separately and focused

primarily on survivors. This highlights the necessity for multidisciplinary interventions, as proposed in this study.

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Contributors

Cruz-Ramos: protocol design, principal researcher, and draft preparation. Fajardo-Espinoza: Protocol design, draft preparation, nutritional intervention design, and implementation. Martinez-Palacios: Draft preparation and hybrid educational intervention design. Pérez-Camargo: Nutritonal intervention design and implementation. Cedillo-Compeán: Oncological rehabilitation intervention design and implementation. Rodríguez-Fonseca: Mindfulness specialist, hybrid educational intervention design and implementation. Blandón-Hernández and Labra-Alvarado: Psychological and Mindfulness Intervention Implementation. Gálvez-Hernández and Bejarano-Colina: Psychological intervention design and implementation. Villarreal-Garza: Reviewer and protocol design. Cabrera-Nieto, Barranco-Cortés, González-Pérez, Madariaga-Cobos: Nutritional intervention implementation. Bargalló-Rocha, Matus-Santos, Espinosa-Fernández and Cabrera-Galeana oncological follow-up protocol and patient reference to the program. Mohar-Betancourt: Reviewer and protocol design.

Conflict of interest

The authors declare no conflicts of interest.

Patient consent for publication. Not required

Ethics approval

The authors declare that this study was conducted according to the Declaration of Helsinki, and all procedures were performed with adequate understanding and written consent from the individuals. The study protocol was approved by the Ethics Committee of Instituto Nacional de Cancerología (023-005-OMI, CEI-025022).

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Data availability statement.

Study results are not available yet.

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