

Effects of an Online Physical Exercise Program on Fatigue, Cognition, and Anxiety Among Breast Cancer Survivors during the COVID-19 Pandemic

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Efeitos de um Programa On-line de Exercício Físico sobre Fadiga, Cognição e Ansiedade de Sobreviventes de Câncer de Mama durante a Pandemia da Covid-19

Efectos de un Programa en Línea de Ejercicio Físico sobre Fatiga, Cognición y Ansiedad de Supervivientes de Cáncer de Mama durante la Pandemia de COVID-19

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ABSTRACT

Introduction: During the COVID-19 pandemic, breast cancer survivors faced challenges that exacerbated cancer-related fatigue, cognitive impairments, and anxiety, frequently reported by this population. **Objective:** To investigate the effects of a supervised online physical exercise program on fatigue, cognitive function, and anxiety on breast cancer survivors during the COVID-19 pandemic. **Method:** A pre-experimental study with nine women breast cancer survivors (mean age: 55.89 ± 12.18 years) participating in a university extension program. The intervention consisted of 18 weeks of remotely supervised exercises conducted via video calls, with two 30-minute sessions per week. The program included joint mobility exercises, aerobic and strength activities structured in a circuit format, followed by stretching, with adjustments made every two weeks. Outcomes were assessed before and after the intervention via telephone contact using the Piper Fatigue Scale, FACT-Cog-v3, and STAI questionnaires. Data were analyzed using the Wilcoxon test ($\alpha = 0.05$). **Results:** A significant improvement was observed in the sensory domain of fatigue ($p = 0.042$), while other fatigue domains (total fatigue: $p = 0.128$; behavioral: $p = 0.144$; affective: $p = 0.705$; cognitive-emotional: $p = 0.752$), cognitive function ($p = 0.999$), and anxiety levels (state: $p = 0.104$; trait: $p = 0.400$) remained stable. **Conclusion:** The 18-week program was effective in improving sensory fatigue levels and maintaining stable general fatigue, cognitive function, and anxiety levels in breast cancer survivors during the social distancing imposed by the COVID-19 pandemic.

Key words: Breast Neoplasms; Cancer Survivors; COVID-19; Mental Fatigue; Exercise.

RESUMO

Introdução: Durante a pandemia da covid-19, mulheres sobreviventes de câncer de mama enfrentaram desafios que exacerbaram fadiga relacionada ao câncer, comprometimentos cognitivos e ansiedade, frequentemente relatados por essa população. **Objetivo:** Investigar os efeitos de programa on-line de exercício físico supervisionado remotamente sobre fadiga, função cognitiva e ansiedade em mulheres sobreviventes de câncer de mama durante a pandemia da covid-19. **Método:** Estudo pré-experimental com nove mulheres sobreviventes de câncer de mama (média de idade: 55,89 ± 12,18 anos), participantes de programa universitário. A intervenção consistiu em 18 semanas de exercícios supervisionados remotamente, realizados via chamadas de vídeo, com dois atendimentos semanais de 30 minutos. O programa incluiu exercícios de mobilidade articular, atividades aeróbicas e força, estruturados em formato de circuito, seguidos de alongamentos, com ajustes periódicos a cada duas semanas. Os desfechos foram avaliados antes e após intervenção, via contato telefônico, utilizando questionários Piper Fatigue Scale, FACT-Cog-v3 e IDATE. Os dados foram analisados pelo teste de Wilcoxon ($\alpha = 0,05$). **Resultados:** Houve melhora significativa no domínio sensorial da fadiga ($p = 0,042$), enquanto outros domínios da fadiga (fadiga total: $p = 0,128$; comportamental: $p = 0,144$; afetiva: $p = 0,705$; cognitivo-emocional: $p = 0,752$), função cognitiva ($p = 0,999$) e níveis de ansiedade (estado: $p = 0,104$; traço: $p = 0,400$) permaneceram estáveis. **Conclusão:** O programa de 18 semanas foi eficaz em melhorar os níveis de fadiga sensorial e manter estáveis a fadiga geral, função cognitiva e ansiedade em sobreviventes de câncer de mama durante distanciamento social imposto pela pandemia da covid-19.

Palavras-chave: Neoplasias da Mama; Sobreviventes de Câncer; COVID-19; Fadiga Mental; Exercício Físico.

RESUMEN

Introducción: Durante la pandemia de COVID-19, las sobrevivientes de cáncer de mama enfrentaron desafíos que exacerbaron la fatiga relacionada con el cáncer, los déficits cognitivos y la ansiedad, frecuentemente reportados en esta población. **Objetivo:** Investigar los efectos de un programa en línea de ejercicio físico supervisado remotamente sobre la fatiga, la función cognitiva y la ansiedad en sobrevivientes de cáncer de mama durante la pandemia de COVID-19. **Método:** Estudio preexperimental con nueve mujeres sobrevivientes de cáncer de mama (promedio de edad: 55,89 ± 12,18 años) participantes de un programa universitario. La intervención consistió en 18 semanas de ejercicios supervisados de forma remota, realizados mediante videollamadas, con dos sesiones semanales de 30 minutos. El programa incluyó ejercicios de movilidad articular, actividades aeróbicas y de fuerza, estructuradas en formato de circuito, seguidas de estiramientos, con ajustes realizados cada dos semanas. Los resultados se evaluaron antes y después de la intervención, mediante contacto telefónico, utilizando los cuestionarios Piper Fatigue Scale, FACT-Cog-v3 e IDATE. Los datos se analizaron mediante la prueba de Wilcoxon ($\alpha = 0,05$). **Resultados:** Se observó una mejora significativa en el dominio sensorial de la fatiga ($p = 0,042$), mientras que otros dominios de la fatiga (fatiga total: $p = 0,128$; conductual: $p = 0,144$; afectiva: $p = 0,705$; cognitivo-emocional: $p = 0,752$), la función cognitiva ($p = 0,999$) y los niveles de ansiedad (estado: $p = 0,104$; rasgo: $p = 0,400$) se mantuvieron estables. **Conclusión:** El programa de 18 semanas fue eficaz para mejorar los niveles de fatiga sensorial y mantener estables la fatiga general, la función cognitiva y los niveles de ansiedad en sobrevivientes de cáncer de mama durante el distanciamiento social impuesto por la pandemia de COVID-19.

Palabras clave: Neoplasias de la Mama; Supervivientes de Cáncer; COVID-19; Fatiga Mental; Ejercicio Físico.

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INTRODUCTION

In 2020, the World Health Organization (WHO) declared the outbreak of the coronavirus disease 2019 – COVID-19 as a pandemic, given the high spread rate and severity of the symptoms associated¹ which entailed several restrictive measures globally as social isolation and strict lockdowns to contain the virus. Although necessary, they caused negative impacts over the practice of physical activity² and health damaging effects to the mental health of many populations³.

Among women survivors of breast cancer, COVID-19 deepened oncologic challenges aggravated by the high risk of complications due to immunologic vulnerability caused by the treatments⁴. Persistent symptoms as cancer-related fatigue, cognitive and anxiety compromise frequently reported by survivors^{5,6}, may have been exacerbated by the imposed restrictions as social isolation and limited access to rehabilitation and support services.

To face this challenge, regular practice of physical exercises stands out as a non-pharmacological strategy effective to reduce fatigue and promotion of mental well-being in women diagnosed with breast cancer^{7,8}.

International guidelines recommend that cancer survivors practice at least 150 minutes weekly of moderate or 75 minutes of vigorous intensity physical activities⁹⁻¹¹. In Brazil, however, there is a remarkable lack of initiatives integrating the practice of physical exercises into oncologic treatment protocols¹². This context, intensified by the pandemic imposed restrictions, led to a serious drop of adherence to physical exercises in Brazilian women survivors of breast cancer who reported decline of levels of physical activity¹³. Globally, similar situations unchained negative implications over the quality of life and increased cancer related fatigue of the oncologic population during confinement¹⁴.

Given the barriers hampering the regular practice of physical activity, online exercise programs have emerged as viable alternatives, ensuring more accessibility to breast cancer survivors who are able to keep routine practices even in difficult conditions as during the pandemic¹⁵.

In this context, remote supervised exercises interventions have been proven effective, promoting improvement of physical fitness and fatigue for this population¹⁶. An example of this approach was applied by the study group¹⁷ in women survivors of breast cancer who were able to keep fatigue levels stable after 12 weeks of a remote supervised exercise program initiated soon after the first wave of social distancing between May and August 2020.

The objective of the present study is to investigate the effect of an 18-week remote supervised physical exercise

program over cancer-related fatigue, cognitive function and anxiety in women survivors of breast cancer during the COVID-19 pandemic.

METHOD

Pre-experimental pre and post intervention design study investigating the effects of a supervised online physical exercise program during 18 weeks, from March to July 2021 in the city of Pelotas, state of Rio Grande do Sul in compliance with the state's guidelines of social distancing and reduction of in-person activities. Data were collected remotely via telephone or videocall.

The sample consisted of women survivors of breast cancer selected by convenience who joined a university extension program titled Exercise Research in Cancer (ERICA), connected to “*Escola Superior de Educação Física e Fisioterapia (Esef)*” of the “*Universidade Federal de Pelotas (UFPel)*”. Since 2017, the project ERICA offers programs of physical exercise for this population with twice a week in-person encounters at the facilities of *Esef*. Due to the pandemic, this program was conducted online since May 2020¹⁷.

All the participants of the ERICA project were invited to join the study. The inclusion criteria were: women diagnosed with stages I to III breast cancer, aged 18 years or older who have completed primary treatment (surgery, chemotherapy and/or radiotherapy) for at least six months. Those in hormone treatment were enrolled as well. They were briefed about the study procedures and upon agreeing to join, signed the informed consent form through video recording and stored under the supervision of the investigators.

Upon confirmation of fitness to start the program of exercises, earlier trained investigators conducted telephone interviews to collect clinical and demographic information and evaluate the outcomes of cancer-related fatigue, cognitive function and anxiety before beginning the online program of physical exercises. The outcomes were collected again post-intervention (week 19) to compare the results.

Cancer related fatigue was measured through the questionnaire Piper Fatigue Scale¹⁸, validated for the Brazilian population. The scale consists of a 22-items numbered from 0 to 10 distributed in four domains of fatigue: behavioral, affect, sensory and cognitive/emotional in addition to total fatigue score. Mean scores provide classification of mild (1-3), moderate (4-6) or severe (7-10) fatigue.

Cognitive function was evaluated by Functional Assessment of Cancer Therapy – Cognitive Function – Version 3 (FACT-Cog v.3)¹⁹, formed by 37 items

investigating perceived cognitive impairments, comments from others, perceived cognitive abilities and impact on quality of life of the oncologic population. Each item presents five responses options ranging from 0 (not at all) to 4 (very), higher scores indicate high cognitive compromise.

Anxiety levels were measured by the Anxiety and State-Trait Inventory (IDATE)²⁰ validated for Brazil. IDATE is divided in two 20-item scales each: anxiety state (IDATE-E) and anxiety-trait (IDATE-T), with responses ranging from 1 (nothing) to 4 (very). The total result for each scale classified anxiety in low (20-30), moderate (31-49) or high (≥ 50).

The online physical exercise program was conducted and supervised through video calls performed twice a week in non-consecutive days for an 18-week period. 30-minute encounters with small groups with three participants at the most allowed customized assistance. Three *Eseff/UFPEL* graduate students dully trained supervised the activities. Before the intervention, the participants received an instructive video with detailed guidelines about how online sessions should be made.

Each session included articular mobility exercises, the main part structured in circuit with aerobic activities (stimuli in self-selected fast rhythm) and strength (submaximal and self-selected using the weight of the own body or alternative material as bottle of water), balance exercises (increase of complexity of exercise during weeks) and a final stretching series. The volume of aerobic exercises increased progressively, at each meso-cycle of two weeks while the volume of strength exercises followed an undulation model alternating periods of high and low load along the intervention.

The frequency to the program of online exercises in the present investigation was defined as the mean proportion of sessions effectively performed in relation to the total of sessions programmed during 18 weeks of intervention. The calculation was individual for each participant and, later, the overall mean of the group was obtained, considering all the women enrolled, regardless of having completed or discontinued the program. The adherence was defined as participation of at least 70% of the sessions programmed, a criteria adopted to identify those who were consistently involved with the intervention. Therefore, the frequency reflects the mean involvement of the group while the adherence allows to check the proportion of participants who reached a satisfactory level of participation.

The activities were adjusted at every two weeks and new explanatory videos were offered to the participants with specific instructions for each phase exercises. The focus of the training was to promote a safe and adapted physical stimuli, matched to social distancing and

limitations of online intervention. Additional details about the training program can be found in Chart 1. In addition, illustrations of the strength exercises, showing the initial and final position of each movement are available as Supplementary Material.

The outcomes are expressed as median and interquartile range, pre and post intervention were compared by Wilcoxon non-parametric test²¹ with level of significance of 5%; SPSS²² version 26.0 was adopted for the statistical analysis.

The Ethics Committee of *Ufpel* approved the study, report number 4599437 (CAAE (submission for ethical review): 31893920.7.0000.5313) in compliance with Directive number 466/12²³ of the National Health Council for studies with human beings.

RESULTS

The initial sample was formed by nine women survivors of breast cancer whose sociodemographic and clinical characteristics as age, education, type of oncologic treatment and other relevant variables are presented in Table 1. However, two women discontinued the program for personal reasons and did not attend any session. The mean frequency of all the nine women ($n = 9$) was 64.5%. In addition, seven participants (77.8%) met the adherence criteria and attended at least 70% of the encounters.

The results of the outcomes of cancer-related fatigue, cognitive function and anxiety measured pre and post-intervention are shown in Table 2.

The domain sensory fatigue was the only one to present statistically significant reduction ($p = 0.042$), five participants reduced their scores. One of them reduced sensory fatigue from severe (7 points) to mild (2 points). No statistically significant differences were found for the other domains (behavioral, affect, cognitive-emotional and total) although three participants have reduced total fatigue scores, other three kept their scores stable, including two who remained asymptomatic at the beginning and end of the intervention (0 points).

No significant differences were found for group scores, some participants reported improvement for specific aspects of the cognitive function. Four reported reduction of impairments perceived and one, increase of the perceived cognitive abilities, the score went from 16 to 21. The impact on the quality of life remained stable for most of them, but the total score ranged from stability to minor reductions as occurred with one participant, her scores reduced from 109 to 93. These data suggest individual benefits, although without statistical significance.

Four participants reported reduction of anxiety-state, the score of one of them reduced from 51 to 33 points.



Chart 1. Remote supervised physical exercise program

Weeks	Volume	Exercises
1-2	Articular mobility: 2 exercises/2 x 15 repetitions each Aerobic: 1 exercise alternated with strength block/4 x 45s Strength: 6 exercises divided in 3 blocks/3 x 15 repetitions each Balance: 1 exercise/1 x 30 s each leg Stretching Meditation: 1 x 5 min	Articular mobility: Shoulder and hips Aerobic: 45 s jumping jack Strength: Block 1 Free squat Push up in wall Aerobic: 45 s jumping jack Strength: Block 2 Good morning Reverse fly Aerobic: 45 s jumping jack Strength: Block 3 Triceps on wall (elbows extension) Sit-up (arms crossed over chest) Aerobic: 45 s jumping jack Balance: 30 s single leg with foot suspended backwards
3-4	Articular mobility: 2 exercises/2 x 12 repetitions each Aerobic: 1 exercise alternated with strength blocks/4 x 1 min Strength: 6 exercises divided in 3 blocks/3 x 12 repetitions each Balance: 1 exercise/1 x 10 repetitions each leg Stretching Meditation: 1 x 5 min	Articular mobility: Shoulder and ankles Aerobic: 1 min modified race Strength: Block 1 Free squats Push up on sofa with knees on the floor Aerobic: 1 min modified race Strength: Block 2 Good morning Bent over row Aerobic: 1 min modified race Strength: Block 3 Biceps curls (elbows flexion) Row sit up Aerobic: 1 min modified race Balance: Knees raise
5-6	Articular mobility: 2 exercises/2 x 10 repetitions each Aerobic: 1 exercise alternated with strength blocks/4 x 1 min 15 s Strength: 6 exercises divided in 3 blocks/3 x 10 repetitions each Balance: 1 exercise/1 x 12 repetitions each leg Stretching Meditation: 1 x 5 min	Articular mobility: Wrist and hip Aerobic: 1 min 15 s running in place Strength: Block 1 Isometric chair Push up on sofa Aerobic: 1 min 15 s running in place Strength: Block 2 Stiff High row Aerobic: 1 min 15 s running in place Strength: Block 3 Triceps skullcrusher Sit up (arms crossed over chest) Aerobic: 1 min 15 s running in place Balance: Hip airplane

It continues...

Chart 1. Continuation

Weeks	Volume	Exercises
7-8-9	Articular mobility: 2 exercises/2 x 8 repetitions each Aerobic: 1 exercise alternating strength blocks/4 x 1 min 30 s Strength: 6 exercises divided in 3 blocks/3 x 8 repetitions each Balance: 1 exercise/1 x 15 repetitions each leg Stretching Meditation: 1 x 5 min	Articular mobility: Thorax and hip Aerobic: 1 min 30 s side move in limited space Strength: Block 1 Free squat Push up with knees on floor Aerobic: 1 min 30 s side move in limited space Strength: Block 2 Stiff Shoulder press Aerobic: 1 min 30 s side move in limited space Strength: Block 3 Biceps curls (elbows flexion) Bicycle Aerobic: 1 min 30 s side move in limited space Balance: Hip airplane lateral Aerobic: 1 min 30 s jumping jack Articular mobility: Shoulder and spine Aerobic: 1 min 30 s jumping jack Strength: Block 1 Lunge (with bar for balance) Push up with knees on the floor Aerobic: 1 min 30 s jumping jack Strength: Block 2 Stiff Bent over row Aerobic: 1 min 30 s jumping jack Strength: Block 3 Overhead triceps extension 20 s isometric plank Aerobic: 1 min 30 s jumping jack Balance: 30 s single leg, with foot suspended backward Aerobic: 1 min 40 s modified running Articular mobility: Shoulder and ankle Aerobic: 1 min 40 s modified running Strength: Block 1 Lunge Push up with knees on floor Aerobic: 1 min 40 s modified running Strength: Block 2 Unilateral Stiff Bent over row Aerobic: 1 min 40 s modified running Strength: Block 3 Biceps curls (elbows flexion) 30 s isometric plank Aerobic: 1 min 40 s modified running Balance: Knee raise
10-11	Articular mobility: 2 exercises/2 x 10 repetitions each Aerobic: 1 exercise alternating strength blocks /5 x 1 min 30 s Strength: 6 exercises divided in 3 blocks/3 x 8 repetitions each Balance: 1 exercise/1 x 30 s each leg Stretching	
12-13	Articular mobility: 2 exercises/2 x 10 repetitions each Aerobic: 1 exercise alternating with strength blocks/5 x 1 min 40 s Strength: 6 exercises divided in 3 blocks/3 x 10 repetitions each Balance: 1 exercise/1 x 15 repetitions each leg Stretching	

It continues...



Chart 1. Continuation

Weeks	Volume	Exercises
14-15	Articular mobility: 2 exercises/2 x 10 repetitions each Aerobic: 1 exercise alternating with strength blocks/5 x 1 min 50 s Strength: 6 exercises divided in 3 blocks/3 x 12 repetitions each Balance: 1 exercise/1 x 12 repetitions each leg Stretching	Aerobic: 1 min 50 s running in place Articular mobility: Spine and hip Aerobic: 1 min 50 s running in place Strength: Block 1 Lunge Push up with knees on the floor Aerobic: 1 min 50 s running in place Strength: Block 2 Pelvic lift Reverse fly Aerobic: 1 min 50 s running in place Strength: Block 3 Triceps on wall (elbow extension) 40 s isometric plank Aerobic: 1 min 50 s running in place Balance: Hip airplane
		Aerobic: 2 min side move in a limited space Articular mobility: spine and hip Aerobic: 2 min side move in a limited space Strength: Block 1 Walking lunges Push up with knees on the floor Aerobic: 2 min side move in a limited space Strength: Block 2 Unilateral pelvic lift One arm dumbbell bent over row Aerobic: 2 min side move in a limited space Strength: Block 3 Biceps curls (elbows flexion) Isometric plank (maximum) Aerobic: 2 min side move in a limited space Balance: Hip airplane lateral
16-17-18	Articular Mobility: 2 exercises/2 x 10 repetitions each Aerobic: 1 exercise alternating with strength blocks/5 x 2 min Strength: 6 exercises divided in 3 blocks/3 x 15 repetitions each Balance: 1 exercise/1 x 10 repetitions each leg Stretching	

Another two kept stable and one, a minor increase from 40 to 43. Three participants reported decline of anxiety-trait, while other two increased and other two remained stable. Despite the absence of statistically significant differences, the results indicate that the program may have prevented aggravation for participants with initial elevated grades of anxiety.

DISCUSSION

The results indicate that a twice a week online supervised physical exercises program through videocall for 18 weeks was effective in improving significantly

the domain sensory of cancer related fatigue in women survivors of breast cancer. In addition, the program contributed to stable general perception of fatigue, cognitive function and anxiety even during a challenging period of COVID-19 imposed social restrictions. These findings are quite relevant, given the increase of sedentarism during the quarantine and its potential negative effects over the physical and mental health of vulnerable individuals as the population of women investigated.

The literature provides robust evidences that the regular practice of physical exercises is able to minimize cancer-related fatigue^{7,24,25}. The current study validates

these findings because it has been demonstrated that an online physical program resulted in significant improvement of the domain sensory fatigue which causes perceived physical discomfort as exhaustion and sensation of body weight²⁶.

This improvement can be associated with physiologic benefits as increase of cardiorespiratory capacity and optimization of energetic metabolism²⁷. In addition, the reduction of sensory fatigue may be mediated by neurophysiologic mechanisms, including the regulation of the central nervous system and improvement of hormone balance which positively influence the subjective

perception of well-being²⁸. The fact that only this domain presented significant improvement can be related to its predominantly physical nature while other domains of fatigue (behavioral, affect, and cognitive-emotional) can be more impacted by emotional or psychological factors that require additional interventions to be modified significantly²⁹.

As the other domains evaluated – behavioral, affect, cognitive-emotional fatigue, cognitive function and levels of anxiety – had no positive effects, it suggests that, in part, the program may have not reached the required intensity or frequency to change these results significantly.

More effective interventions on fatigue usually include moderate to vigorous 30-minute sessions aerobic training at least thrice a week^{25,27}. Zhou et al.⁷ highlight that combined exercises programs (aerobics and strength), performed thrice a week caused relevant improvements of fatigue in cancer survivors.

Only two sessions a week without progression of intensity adopted in the present study may explain the unaltered outcomes. In addition, the participants have already mild levels of fatigue in the beginning of the intervention (score fatigue: 2.59 ± 2.79 points), which may have influenced the possibility of observing significant changes in domains which theoretically were already controlled.

The stable levels of fatigue, cognitive function and anxiety observed herein can be seen as a positive signal. During the lockdown, the interruption of daily routines and reduction of physical activity contributed to the generalized increase of symptoms as anxiety, stress and cognitive compromise^{14,30}. In this context, the stability of the indicators evaluated suggests that the participation in the remote exercises program may have caused a protective effect and mitigated the aggravation of these symptoms.

However, the lack of a control group prevented the confirmation of this hypothesis since participants who do not have access to the program could have responded differently. Still, it is widely acknowledged that the regular practice of physical exercises reduces the risk of depression and anxiety, especially in stressful contexts^{31,32}. This may indicate that the intervention proposed appears to have contributed to minimize the negative impacts of the pandemic over mental health and consequently, on the participants quality-of-life.

It is essential to acknowledge that online supervised interventions are potentially significant to promote health and well-being of women survivors of breast cancer not only during the COVID-19 pandemic³³, but as a valuable strategy in the current days¹⁶. The adoption of online exercises allow these women to overcome common barriers as low motivation, poor access to proper venues and

Table 1. Characteristics of the study sample

Characteristics	n = 9
Age, years, mean $\pm$ SD	55.89 $\pm$ 12.18
Education, n (%)	
≤ 8 years	2 (22.3%)
9-11 years	4 (44.4%)
12 years or more	3 (33.3%)
Body mass, kg, mean $\pm$ SD	77.05 $\pm$ 12.38
BMI, n (%)	
<25 kg/m ²	0 (0%)
25-<30 kg/m ²	3 (33%)
≥30 kg/m ²	6 (67%)
Time of diagnosis, years, mean $\pm$ SD	3.14 $\pm$ 1.22
Staging, n (%)	
I	4 (44.4%)
II	4 (44.4%)
III	1 (11.2%)
Surgery, n (%)	
Mastectomy	4 (44%)
Quadrantectomy	5 (56%)
Treatment, n (%)	
Only chemotherapy	2 (22.3%)
Only radiotherapy	3 (33.3%)
Chemotherapy and radiotherapy	4 (44.4%)
Hormone therapy, n (%)	8 (89%)
Tobacco, n (%)	
Never smoked	4 (44.4%)
Ex-smoker	4 (44.4%)
Smoker	1 (11.2%)
Diabetes, n (%)	3 (33%)
Hypertension, n (%)	4 (44%)

Captions: SD = standard deviation; n = number; BMI = body mass index.



Table 2. Median and interquartile range of cancer related fatigue, cognitive function and anxiety pre and post 18 weeks intervention (n=7)

Outcomes	Pre-intervention		Post-intervention		P
	Median	p25-p75	Median	p25-p75	
Fatigue					
Behavioral	0.00	0.00-5.00	0.50	0.00-3.50	0.144
Affect	0.00	0.00-5.00	2.00	0.00-4.20	0.705
Sensory	2.60	0.00-6.00	2.20	0.00-4.40	0.042*
Cognitive-emotional	2.67	0.17-5.50	2.00	0.00-4.67	0.752
Total	1.32	0.09-5.50	2.04	0.00-4.45	0.128
Cognitive function					
Perceived impairments	64.00	37.00-77.00	49.00	40.00-77.00	0.753
Comments from others	15.00	15.00-16.00	15.00	10.00-16.00	0.197
Abilities perceived	17.00	15.00-30.00	21.00	14.00-32.00	0.491
Impact on quality-of-life	14.00	10.00-16.00	14.00	11.00-16.00	0.414
Total	109.00	77.00-140.00	93.00	85.00-143.00	0.999
Anxiety					
Anxiety-status	36.00	28.00-51.00	33.00	23.00-43.00	0.104
Anxiety-trait	38.00	23.00-47.00	36.00	25.00-46.00	0.400

Captions: (*) p statistically significant; p25-p75 = 25th and 75th percentiles.

concerns with personal safety³⁴. The current intervention with satisfactory adherence by participants (83%), exemplifies the possibility of this approach, important to maintain adequate levels of physical activities and prevention of inactivity. Furthermore, adjusting health services to include online exercises programs is a significant improvement for this vulnerable population, contributing to improve the quality of life and mitigation of cancer associated complications.

The study limitations are the small number of participants, lack of control group and enrollment by convenience with women physically active before the intervention. These factors may have influenced the results and restricted the generalization of the conclusions since the lack of control group for comparison hampers the evaluation of the efficacy of the program. In addition, the enrollment of already active participants may have introduced a bias since the benefits of frequent exercises are more evident in less active individuals³⁵.

Despite these limitations, the extension program showed a significant capacity of adaptation during the pandemic offering continuous online support to the participants. This approach reinforces the feasibility of implementing online physical exercises program as a practical and accessible strategy for vulnerable populations even in difficult conditions. Future investigations with larger samples and more diversified are essential to

elucidate the role of physical exercises to maintain and promote mental and physical health of breast cancer survivors, especially during a crisis.

CONCLUSION

The results show that the online supervised physical exercises intervention can be effective to improve sensory fatigue and stability of anxiety and cognition in women survivors of breast cancer during the COVID-19 pandemic. This program offered a viable alternative to face the challenges imposed by social distancing, highlighting the importance of strategies that promote the well-being of this vulnerable population. It is reinforced the necessity of continuous investment in models of adaptable intervention to ensure health and quality of life for these women.

CONTRIBUTIONS

All the authors contributed substantially to the study design, acquisition, analysis and interpretation of the data, writing and critical review. They approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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