The impact of dance as a non-pharmacological adjuvant therapy cancer survivors: a clinical trial

O impacto da dança como terapia adjuvante não farmacológica em sobreviventes de cancer: um ensaio clínico

El impacto de la danza como terapia adyuvante no farmacológica en sobrevivientes de cancer: un ensayo clínico

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Abstract
This study aimed to investigate the impact of dance as a non-pharmacological adjuvant therapy on the quality of life (QoL), pain sensation, and depression of female cancer survivors. Method: We conducted a parallel, open-label, randomized, controlled clinical trial where cancer patients were invited to experience dance as a language. The intervention comprised two dance group classes per week for 20 weeks involving creative dance processes and light to moderate physical exercises. The participants were randomized into two groups – control (did not undergo the dance classes) and intervention (underwent the dance classes) – and answered questionnaires before, during, and after the intervention. We assessed the QoL (Functional Assessment of Cancer Therapy General), pain perception (Visual Analog Scale and McGill Pain Questionnaire), and depression (Hamilton Depression Rating Scale). Results: The statistical data analyses revealed that the intervention and control groups did not present statistical differences in age, cancer type, stage of disease, surgical treatment, and scapular and pelvic involvement. The results showed an improvement in the intervention group's QoL regarding the affective, miscellaneous, sensory, and total dimensions and decreased pain perception and depression. Conclusion: This clinical trial presented dance as a complementary non-pharmacological adjunct therapy for cancer survivors' treatment, improving quality of life and decreasing pain perception and depressive processes. Implications for cancer survivors: The practice of dance as a language is a valid intervention to help female cancer survivors face the disease's physical and psychosocial effects.
Keywords: Adjuvant therapy; Dance; Quality of Life; Cancer survivors.

Resumo
Objetivo: O objetivo deste estudo foi investigar o impacto da dança como terapia adjuvante não farmacológica na qualidade de vida (QV), sensação de dor e depressão em mulheres sobreviventes de câncer. Método: Realizamos um ensaio clínico de tratamento, paralelo, aberto, randomizado-controlado, com vivências da dança como linguagem. Através de 2 aulas de dança por semana, em grupo, durante 20 semanas, envolvendo processos criativos em dança e exercícios físicos leves a moderados. Questionários foram respondidos antes, durante e após a intervenção. As

participantes foram randomizadas em dois grupos – controle (não realizou as aulas de dança) e intervenção (realizou as aulas de dança) – e responderam questionários antes, durante e após a intervenção. Avaliamos a QV (Functional Assessment of Cancer Therapy General), a percepção da dor (Visual Analog Scale e McGill Pain Questionnaire) e a depressão (Hamilton Depression Rating Scale). Resultados: A análise estatística dos dados revelou que o grupo intervenção e controle não apresentavam diferença estatística em: faixa etária, tipo de câncer, estádio da doença, cirurgia e acometimento escapular e pélvico. Os resultados mostraram, no grupo intervenção, apresentou melhora da QV, das dimensões afetiva, miscelânea, sensorial e total das dimensões, diminuição de dor e depressão. Conclusão: Este estudo apresenta a dança como terapia adjuvante não farmacológica complementar no tratamento de sobreviventes ao câncer, proporcionando melhora da qualidade de vida, dor e processos depressivos. Implicações para as sobreviventes de câncer: A prática da dança como linguagem é uma intervenção válida para mulheres sobreviventes do câncer enfrentarem os efeitos físicos e psicossociais da doença.

Palavras-chave: Terapia adjuvante; Dança; Qualidade de Vida; Sobreviventes de câncer.

Resumen
Objetivo:Iinvestigar el impacto de la danza como terapia adyuvante no farmacológica en la calidad de vida (CdV), la sensación de dolor y la depresión en mujeres sobrevivientes de cáncer. Método: Ensayo clínico de tratamiento, paralelo, abierto, controlado aleatorizado, con experiencias de la danza como lenguaje. A través de 2 clases de danza por semana, en grupo, durante 20 semanas, involucrando procesos creativos en la danza y ejercicios físicos ligeros a moderados. Los participantes fueron aleatorizados en dos grupos: control (no asistieron a clases de baile) e intervención (asistieron a clases de baile), y respondieron cuestionarios antes, durante y después de la intervención. Evaluamos la calidad de vida (evaluación funcional de la terapia general del cáncer), la percepción del dolor (escala analógica visual y el cuestionario de dolor de McGill) y la depresión (escala de calificación de depresión de Hamilton). Resultados: Grupos intervención y control no presentaron diferencias estadísticas en: grupo etario, tipo de cáncer, estadio de la enfermedad, cirugía y afectación escapular y pélvica. Los resultados mostraron, en el grupo de intervención, mejor calidad de vida, dimensiones afectivas, misceláneas, sensoriales y totales, disminución del dolor y depresión. Conclusión: la danza como una terapia adyuvante no farmacológica complementaria en el tratamiento de sobrevivientes de cáncer, brindando una mejora en la calidad de vida, el dolor y los procesos depresivos. Implicaciones para las sobrevivientes de cáncer: La práctica de la danza como lenguaje es una intervención válida para las mujeres sobrevivientes de cáncer a sobrellevar los efectos físicos y psicosociales de la enfermedad.

Palabras clave: Terapia adyuvante; Danza; Calidad de vida; Sobrevivientes de cáncer.

1. Introduction

Cancer and its treatment cause pain (Costa et al., 2017) physical and psychosocial changes (Murphy, 2010), and changes in self-image perception (NCI, 2019). These processes contribute significantly to morbidity through immediate and delayed effects on physical or psychosocial health (Lopez et al., 2017), reducing the quality of life (QoL) and cancer treatment adherence (He et al., 2018).

Complementary and integrative therapies help improve the well-being, QoL, immune function, and pain relief, and reduce disease symptoms and side effects of conventional treatments (Lopez et al., 2017; Greenlee, 2017). Non-pharmacological approaches are centered around people, empowering their self-care during and after treatment, bearing in mind that true healing requires nourishing the mind, soul, and body (Gannotta et al., 2018; Witt et al., 2017).

In this perspective, physical exercises and art forms are interesting non-pharmacological adjuvant therapies for cancer survivors (Silva et al., 2020; Dos Santos et al., 2017; Koom et al., 2016). Different dance modalities, such as Dance Movement Therapy (Vardhan et al., 2022; Tortora, 2019; Goodill, 2018; Ho et al., 2016), Ballroom Dancing (Pisu et al., 2017), Greek Tradicional Dance (Kaltsatou et al., 2011) and belly dance (Boing et al., 2018; Szalai et al., 2017), positively impact cancer survivors' lives, improve their social skills, and decrease cancer pain and depressive processes (Cruz et al., 2022).

This article reports a randomized clinical trial that evaluated the dance's potential as a non-pharmacological adjuvant therapy to improve QoL and decrease pain and depression in cancer survivors.

2. Methodology

a – Study type and eligibility criteria

The research was a parallel, open-label, randomized, controlled clinical treatment trial conducted in Goiânia (Goiás,

Brazil) with approval by multiple Ethics Committees. The participants were female cancer survivors undergoing treatment at Hospital Araújo Jorge (ACCG) and the Institute of Oncology and Hematology of Goiânia (INGOH). All participants were over 18 years old, with any type of cancer, and resided in Goiânia or its metropolitan area. Additionally, they should have a medical referral to practice light to moderate physical activity and be able to participate in the intervention twice a week. We excluded those who failed to meet the eligibility criteria.

b – Randomization Process

The investigators contacted the women after their medical referral. Those who met the eligibility criteria and consented to participate in the research were randomized into intervention and control groups. The intervention group participated in dancing classes for 20 weeks and answered questionnaires. The control group did not take the classes and only answered the questionnaires. After 20 weeks, the dance classes were made available to the control group.

c – Intervention

The intervention comprised two group classes per week (of one hour each) at ACCG and INGOH. We promoted creative dance processes within the participants' functional capacities, and light to moderate physical exercises concerning their muscle strength and cardiorespiratory capacity. The creative processes (improvisation and choreographic composition) occurred from understanding dance as a language (Marques, 2010). At the end of the 40 classes, a public class took place where the participants' family members watched and admired their dance.

The classes followed the following protocol:

Stretching: with balance exercises and group perception.

Warm-up: with space dynamics, rhythm development, motor coordination, laterality, and muscle strength; playful propositions to improve self-esteem and arouse empowerment.

Creative processes: we encouraged the participants to improvise during individual and group dynamics and dramatizations, moving their bodies, and discovering communication possibilities through dance.

Choreographic Composition: at the end of the class, a choreography emerged, based on the participants' movement discoveries. Mediated by the dance teacher, the participants' movement suggestions made up the choreographies performed at the public class.
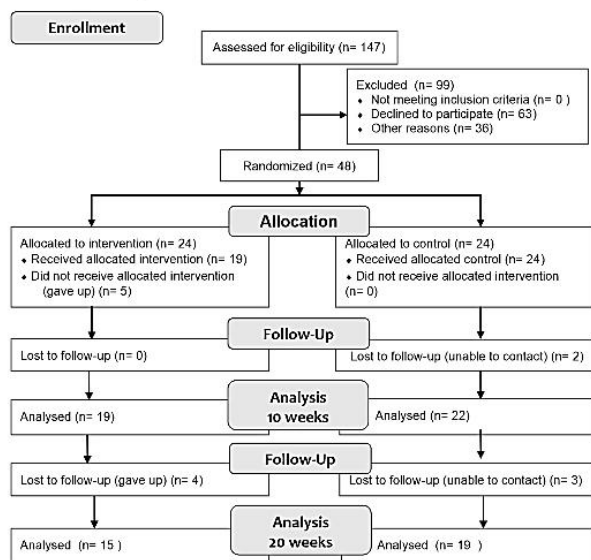
d – Assessment scales

Participants from both groups answered questionnaires before the intervention (Assessment 1), ten weeks in (Assessment 2), and 20 weeks in, soon after the public class (Assessment 3). We analyzed the data statistically: (i) QoL was assessed through the Functional Assessment of Cancer Therapy General (FACT-G); (ii) depression, through the Hamilton Depression Rating Scale (HAM-D); and (iii) pain, through the Visual Analogue Scale (VAS) and McGill Pain Questionnaire (MPQ).
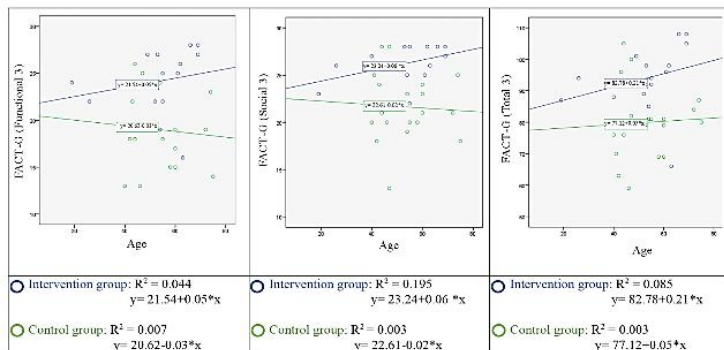
3. Results

Of the 147 patients enrolled, 48 were eligible, but five dropped out after randomization. The final arrangement consisted of 19 participants randomized to the intervention group and 24 to the control group (Figure 1A), with a mean age of 53.8 ± 11.8 years. The statistical analysis revealed that the intervention and control groups were similar in terms of age, cancer type, stage of disease, surgical treatment, and scapular and pelvic involvement. However, they were not similar concerning ethnicity (Table 1).

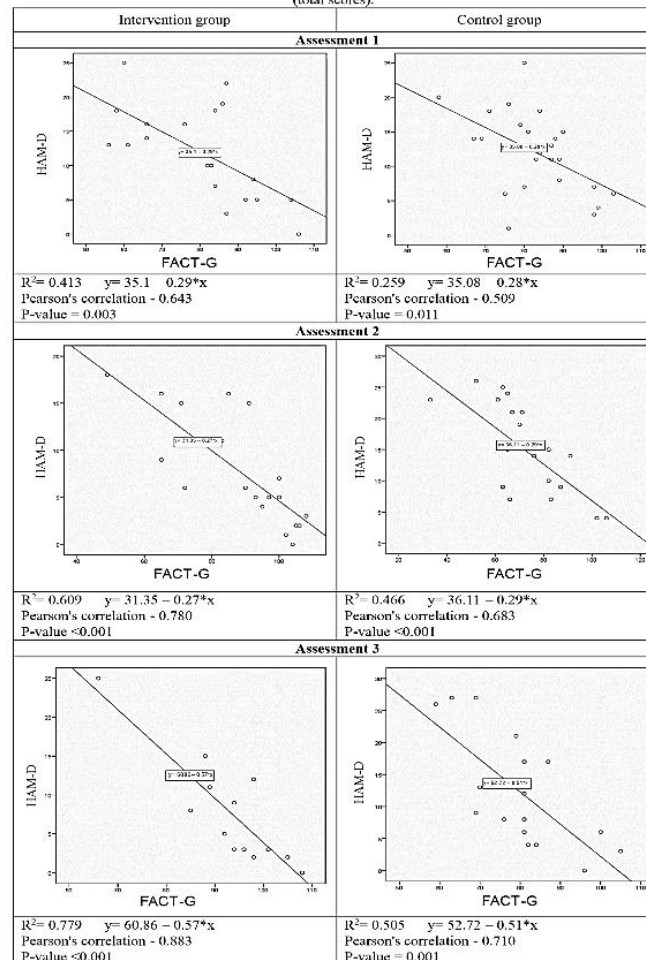**Figure 1:** CONSORT Flow diagram and Dispersion of the values Hamilton scale and FACT-G.

Source: Authors.

Table 1 - Demographics, physical and clinical characteristics of participants by group

	Int. n (%)	Cont n (%)	Valor de p[a]
Ethnicity			0.013[*]
Pardo/native	9 (47.4)	12 (50.0)	
Black	---	7 (29.2)	
White	10 (52.6)	5 (20.8)	
Age			0.542
Older ($\geq$) 50 years	13 (68.4)	14 (58.3)	
Under 50 years	6 (31.6)	10 (41.7)	
Cancer type			0.301
Breast	8 (42.1)	13 (54.2)	
Ovary	---	2 (8.3)	
Intestine	3 (15.8)	1 (4.2)	
Other [c]	8 (42.1)	8 (33.3)	
Disease stage			0.460
I	5 (26.3)	7 (29.2)	
II	4 (21.1)	7 (29.2)	
III	5 (26.3)	2 (8.3)	
IV	5 (26.3)	8 (33.3)	
Surgery			0.403[b]
No	4 (21.1)	7 (29.2)	
Yes	15 (78.9)	17 (70.8)	
Scapular involvement			0.195
No	11 (57.9)	18 (75.0)	
Yes	8 (42.1)	6 (25.0)	
Pelvic involvement			0.306
No	19 (100.0)	22 (91.7)	
Yes	---	2 (8.3)	
Physical activity (2)	(n=19)	(n=22)	<0.001[b*]
No	---	15 (68.2)	
Yes	19 (100.0)	7 (31.8)	
Physical activity (3)	(n=15)	(n=19)	0.001[b*]
No	---	10 (52.6)	
Yes	15 (100.0)	9 (47.4)	
Artistic activity (2)	(n=19)	(n=22)	<0.001[b*]
No	---	19 (86.4)	
Yes	19 (100.0)	3 (13.6)	
Artistic activity (3)	(n=15)	(n=19)	<0.001[b*]
No	---	13 (68.4)	
Yes	15 (100.0)	6 (31.6)	

[a]χ^2 test; [b]Fisher's exact test; [c]Others: thyroid, multiple chondrosarcoma, acute lymphocytic leucemia, lung and brain, sputum cyst / cerebellum, desmoid tumor, chordoma, esophagus, pancreas and liver, cervix, cerebellum.

Source: Authors.

Regarding QoL, when comparing the intervention and control groups in the second and third assessments, there were meaningful statistical differences in the social, functional, and total domains (Table 2). Additionally, age correlated with the FACT-G scale domains in the third assessment (Figure 1B).

Table 2 - Distribution of FACT-G, HAM-D, VAS and MPQ assessments from participants groups.

A) Distribution of FACT-G assessments

	Int. Mean (SD) 95% C.I	Cont. Mean (SD) 95% C.I	p value[a]
Physical1	18.6 (5.6) (16.0, 21.3)	20.8 (4.6) (18.8, 22.7)	0.178
Physical 2	21.3 (6.8) (18.0, 24.6)	18.3 (5.2) (16.0, 20.6)	0.117
Physical 3	22.1 (4.9) (19.3,24.8)	20.5 (4.5) (18.3,22.7)	0.335
Social 1	23.6 (4.8) (21.3,25.9)	24.2 (3.6) (22.7,25.7)	0.626
Social 2	25.0 (2.8) (23.6,26.3)	19.1 (4.9) (17.0,21.3)	<0.001*
Social 3	26.2 (1.9) (25.2,27.2)	21.6 (3.6) (19.9,23.4)	<0.001*
Emotional 1	18.2 (5.2) (15.7,20.7)	18.2 (4.3) (16.3,20.0)	0.844[b]
Emotional 2	19.6 (5.9) (16.8,22.5)	18.0 (5.6) (15.5,20.5)	0.105[b]
Emotional 3	21.5 (2.5) (20.2, 22.9)	19.0 (4.8) (16.7, 21.3)	0.215[b]
Functional 1	20.0 (5.0) (17.5, 22.4)	19.8 (5.8) (17.4, 22.3)	0.946
Functional 2	22.4 (4.7) (20.2, 24.7)	17.1 (5.8) (14.6, 19.7)	0.003*
Functional 3	24.1 (3.4) (22.2, 26.0)	19.0 (4.1) (17.1, 21.0)	<0.001*
Total 1	80.4 (15.3) (73.0, 87.8)	83.0 (10.8) (78.4, 87.5)	0.520
Total 2	88.5 (16.8) (80.4, 96.6)	71.8 (16.2) (64.6, 79.0)	0.003*
Total 3	93.9 (10.6) (88.1, 99.8)	80.0 (11.7) (74.3, 85.6)	0.001*

B) Distribution of HAM-D

	Int. n (%)	Cont n (%)	p value[c]
HAM-D 1			0.779
Normal	2 (10.5)	2 (8.3)	
Borderline	4 (21.1)	5 (20.8)	
Mild	6 (31.6)	11 (45.8)	
Moderate	7 (36.8)	6 (25.0)	
Severe	---	---	
HAM-D 2			0.027*
Normal	5 (26.3)	---	
Borderline	7 (36.8)	4 (18.2)	
Mild	4 (21.1)	8 (36.4)	
Moderate	3 (15.8)	9 (40.9)	
Severe	---	1 (4.5)	
HAM-D 3			0.081
Normal	7 (46.7)	2 (10.5)	
Borderline	1 (6.7)	4 (21.1)	
Mild	6 (40.0)	7 (36.8)	
Moderate	1 (6.7)	3 (15.8)	
Severe	---	3 (15.8)	

C) Distribution of VAS assessment

	Int. Mean (SD)	Cont. Mean (SD)	p value[a]
VAS 1	3.5 (3.0)	3.1 (2.7)	0.712
VAS 2	2.2 (2.5)	4.7 (2.5)	0.003*
p value[c]	<0.001*	0,008*	
VAS 3	3.1 (3.3)	4,7 (3.8)	0.197
p value[c]	0.007*	0.001*	

	Int. n (%)	Cont. n (%)	p value[c]
No pain 1	3 (15.8)	2 (8.3)	0.821
Light pain 1	9 (47.4)	14 (58.3)	
Moderate pain 1	5 (26.3)	5 (20.8)	
Intense pain 1	2 (10.5)	3 (12.5)	
No pain 2	8 (42.1)	1 (4.5)	0.005*
Light pain 2	7 (36.8)	5 (22.7)	
Moderate pain 2	3 (15.8)	13 (59.1)	
Intense pain 2	1 (5.3)	3 (13.6)	
No pain 3	6 (40.0)	6 (31.6)	0.394
Light pain 3	3 (20.0)	1 (5.3)	
Moderate pain 3	3 (20.0)	4 (21.1)	
Intense pain 3	3 (20.0)	8 (42.1)	

D) Distribution of MPQ

	Int. Mean (SD) (95% C.I)	Cont. Mean (SD) (95% C.I)	p value[b]
Affective 1	4.9 (4.6) (2.4, 7.5)	5.2 (3.2) (3.5, 6.8)	0.438
Affective 2	2.7 (4.1) (0.5, 5.0)	5.2 (3.8) (3.3, 7.2)	0.009*
Affective 3	2.0 (2.1) (0.8, 3.2)	2.8 (2.3) (1.7,3.9)	0.286
p value[d]	0.028*	0.003*	
Evaluative 1	2.1 (1.8) (1.1,3.0)	2.1 (1.6) (1.3,2.9)	0.811
Evaluative 2	1.2 (1.5) (0.4, 2.0)	2.1 (1.6) (1.2, 2.9)	0.111
Evaluative 3	2.8 (3.5) (0.9, 4.7)	4.0 (3.8) (2.0, 5.9)	0.302
p value[d]	0.038*	0.054	
Miscellaneous 1	5.4 (5.2) (2.6, 8.3)	6.3 (3.1) (4.8, 7.9)	0.318
Miscellaneous 2	3.2 (3.7) (1.2, 5.3)	6.3 (4.1) (4.2, 8.4)	0.001*
Miscellaneous 3	1.3 (1.3) (0.6, 2.1)	1.6 (1.5) (0.8, 2.3)	0.706
p value[d]	<0.001*	0.002*	
Sensory 1	5.5 (4.4) (3.0, 7.9)	9.1 (2.2) (7.9, 10.2)	0.024*
Sensory 2	4.1 (4.3) (1.7, 6.5)	7.9 (3.4) (6.1, 9.6)	0.001*
Sensory 3	4.4 (4.3) (2. 0, 6.8)	6.1(4.5) (3.8, 8.4)	0.391
p value[d]	0.428	0.110	
Total 1	11.4 (8.5) (6.7, 16.1)	17.0 (5.2) (14.3, 19.7)	0.053
Total 2	9.2 (11.0) (3.1, 15.3)	17.7 (9.1) (13.1, 22.4)	0.006*
Total 3	17.8 (19.3) (7.1, 28.5)	24.5 (19.8) (14.3, 34.6)	0.372
p value[d]	0.261	0.191	

Int. Intervention group; *Cont.* Control group; *1.* Assessment 1; *2.* Assessment 2; *3.* Assessment 3; C.I. Confidence Interval; *SD* standard deviation; * Denotes statistical significance at p ≤ 0.05; [a] Comparation using *t* test for independent samples; [b] Comparation using U test of Mann-Whitney for independent samples; [c] χ^2 test; [d] Analysis of Variance of two Friedman factors by Posts of related samples.

Source: Authors.

When assessing depressive symptoms between the groups, there was a difference in category distribution in the second assessment (HAM-D 2), with a higher proportion of mild, moderate, and severe depression in the control group (p = 0.027; Table 2). The scatter plots showed a statistically significant negative correlation between the control and intervention groups in the three assessments, which suggested an inverse relationship between the depression and QoL levels. There was a significant direct positive correlation in the intervention group regarding the functional well-being, social/family well-being, and total well-being domains (Figure 1C).

Regarding the analysis of pain perception, the VAS evaluation showed different means between the groups in the second assessment (p = 0.003), with 42.1% of the intervention group and 4.5% of the control group presenting no pain (p=0.005). In the intragroup VAS assessment, the control group's average pain perception increased from the first to third assessment. The McGill Scale assessment showed statistically different means between groups for the affective 2 (p = 0.009), miscellaneous 2 (p = 0.001), sensory 1 (p = 0,024) and 2 (p = 0.001), and total dimensions 2 (p = 0.006) in the second assessment. These data are summarized in Table 2.

4. Discussion

Dance is associated with health benefits throughout life, and its practice is associated with improvements in body composition, blood biomarkers, and musculoskeletal function. Therefore, health professionals may recommend it as a safe and effective exercise alternative (Fong et al., 2018). Our study presents the impact of dance – as it addresses both physical and artistic spheres – as a non-pharmacological adjuvant therapy to improve the quality of life and decrease pain and depression in female cancer survivors.

Expressive artistic interventions are associated with mind-body approaches in complementary cancer treatments (Lopez et al., 2017; Greenlee, 2017). The act of dancing emphasizes the motor expression of emotional experiences. The combination of movement and music through dance results in a distinct state characterized by an intensely acute pleasure. The resulting happiness is also of interest when advocating for the use of dance in therapeutic environments (Bernardi et al., 2017).

In the intervention group, and as the participants' age increased, their QoL improved by the end of the intervention, which did not happen in the control group. Therefore, our results indicate that dance is an effective non-pharmacological methodology for improving the QoL of elderly female cancer survivors. These findings are corroborated by other studies that evaluated QoL improvement related to dance, which acts as an effective adjuvant technique (Pisu et al., 2017; Szalai et al., 2017; Kaltsatou et al., 2011; Boing et al., 2018).

The intervention group presented a progressive increase in QOL, with the lowest perceptions of pain and no pain observed in VAS2 and MPQ (Total 2). These findings suggest an inversely proportional relationship between cancer pain and QoL. Costa et al. (2017) also reported a significant negative correlation between painful events and cancer survivors' QoL. Furthermore, they suggested that the way pain is perceived in its multidimensional aspects influences the patients' QoL (Costa et al., 2017).

Regarding depressive symptoms, the intervention group participants presented a lower rate of depression at all levels in the second assessed (HAM-D 2). This may indicate that dance – as an art and a physical exercise – may reduce the depressive condition of female cancer survivors. Dancing is a pleasant physical and social activity that contributes to the cancer survivors' and their family members' adherence to treatment. We verified that dancing enabled the participants to explore their emotions, creating a feeling of empowerment throughout the creative processes and choreographic composition This is corroborated by Tortora (2019), who used the same method with childhood cancer survivors.

5. Conclusion

The dance practice may be adapted to each participant's abilities. Additionally, the intervention can occur for long periods, with due support from a professional team and the participants' family members, as performed in this study. Our findings suggest that dance is a promising therapeutic intervention that may be used as an adjunct therapy to improve the quality of life and reduce pain and depression in cancer survivors.

The development of other clinical trials involving dance as an adjuvant therapy, using the protocol created and developed in this research, should be carried out by other dance researchers in cancer treatment, so that research can occur in continuity and partnership, benefiting the greatest number of patients around the world.

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