



## RESEARCH ARTICLE

### EFFECT OF AEROBIC EXERCISE VERSUS YOGA ON DEPRESSION AMONG WOMEN WITH BREAST CANCER: A RANDOMIZED CONTROLLED TRIAL

\*Alaa M. Fahmy, Hala M. Hanafy, Mohamed F. Mohamed and Mai M. Shehata

Egypt

#### ARTICLE INFO

##### Article History:

Received 20<sup>th</sup> December, 2021

Received in revised form

24<sup>th</sup> January, 2022

Accepted 09<sup>th</sup> February, 2022

Published online 30<sup>th</sup> March, 2022

##### Keywords:

Breast cancer; Depression; Physical Exercise; Yoga.

##### \*Corresponding author:

Alaa M. Fahmy

#### ABSTRACT

**Introduction:** To compare between the effect of aerobic exercise and yoga on depression in breast cancer women. **Methods:** Overall, 40 breast cancer women suffering from depression, aged 25-45 years, were divided randomly into two groups equal in number. Group A (n=20) received aerobic exercise, while group B (n=20) received yoga. Both groups received 24 sessions over an eight weeks' period. Depression was evaluated pre and 8 weeks post intervention for all participants with Zung Self-Rating depression Scale. **Results:** there was a statistical significant decrease in the mean values of depression score in both groups: aerobic exercise and Yoga groups (p value <0.001) with percentage of improvement of depression score was higher in groups A (27.2%) versus in group B (17.48%). There was no statistically significant difference (p>0.05) between the groups (pre intervention) but post intervention there was significant improvement in depression in favor to the aerobic exercise group. **Conclusion:** Physical exercise and yoga are effective supportive interventions in managing depression in breast cancer patients. In addition, physical exercise was found to be superior to yoga in relieving depression.

#### INTRODUCTION

Breast cancer remains by far the most common cancer affecting women worldwide, with an estimated 25% incidence rate among all female cancers. (1) The improvements in diagnosis allow early detection and proper treatment of the disease and this subsequently leads to an increase the 15-year relative survival rates of breast cancer to 78% and making it the highest 5-year survival rates among female malignancies with a percent (80-95%) (2). It can be noticed that at some point of time after diagnosis or throughout treatment, most breast cancer survivors will complain of different physical and psychological side effects related to cancer and the subsequent treatments. With the increased life expectancy of breast cancer survivors, the challenge has shifted from only treating to successfully overcoming side effects of both disease and management for a better improve patients' overall quality of life and provide them with emotional care and support during survivorship (3). Depressive mood is a negative psychological outcome usually reported by breast cancer survivors with prevalence ranging between 1.5% up to 46%, depending on sample size and way of assessment. Symptoms are more intense during diagnosis and active treatment, and prevalence is twice as high compared with that found in the general population. Depression mood is serious as it may cause poor adherence to treatment and even reduce the chance of survival in those women with breast cancer. These associations underline the importance of applying effective treatments to reduce depressive symptoms in breast cancer patients as

psychological status is therefore an essential part of effective treatment (4). Supportive interventions as exercise and Yoga have been provided as mood-enhancing interventions in many studies in those patients. (2) Performing any form of regular exercise and maintaining an active lifestyle in general plays an important role for breast cancers survivors. It helps them to reduce specific side effects of treatment as weakness and depressive symptoms, and it has been shown to increase survival rates and decrease the risk of cancer reappearance. (2) Despite of the available research suggests that physical activity and yoga are effective ways for mood management in breast cancer patients (5, 6). There is only one study comparing them in breast cancer women and it is limited to elderly patients (7). Therefore, the purpose of this study is to compare between the effect of aerobic exercise and yoga in relieving depression in young and middle-aged breast cancer women.

**Subjects and Methods: Design:** A prospective, randomized, single-blind, pre-post-test, controlled trial.

**Participants:** A sample of forty women was selected from National Cancer Institute, Cairo University, Egypt. Women' ages ranged from 25 to 45 years, their body mass index did not exceed 30 kg/m<sup>2</sup> and they have depression's score more than 50 on Zung Self-Rating Depression Scale (8). The women were excluded if their physical status or daily effort may affect the treatment and evaluation stage. They were randomly assigned into two groups equal in number, Aerobic exercise group (group A) and Yoga group (group B) by a blinded and an independent research assistant who opened sealed envelopes that contained a computer generated randomization card.

All participants were given a full explanation of the treatment protocol. After randomization, no women dropped out of the study.

**Evaluation procedures**

**Zung Self-Rating Depression Scale: (8):** The Zung Self-Rating Depression Scale is a depression scale that was designed by Duke University psychiatrist William W.K. Zung MD (1929–1992) in order to assess the level of depression for patients diagnosed with depressive disorder. This scale is a short self-administered survey to quantify the depressed status of a patient. There are 20 items on the scale that rate the four common characteristics of depression: the pervasive effect, the physiological equivalents, other disturbances, and psychomotor activities. The scale is composed of twenty questions; ten positively worded and ten negatively worded questions. Each question is scored on a scale of 1-4 (a little of the time, some of the time, good part of the time, most of the time). The scores range from 25-100; (25-49) Normal Range; (50-59) mildly depressed; (60-69) moderately depressed and (70 and above) severely depressed. Assessment of depression through using Zung Self-Rating depression Scale was performed before and after intervention.

**Treatment procedures:** The subjects were divided randomly into two groups.

**Aerobic exercise (group A):** This group consisted of twenty women with breast cancer suffering from depression and anxiety. These women received aerobic exercise for 50 minutes 3 times per week for 8 weeks.

**Intensity:** The aerobic exercise was in the form of walking on the treadmill for 50 minutes ( warm up 5 minutes exercises and cool down 5 minutes) 3 times per week for 8 weeks. The treadmill (kerller, made in USA) has a deck shock absorption system with rebound effect, suitable for everyone who prefers gentle running with 36 to 40% less pressure on joints. Electronic display screen on the frontal part of the treadmill show speed up separate down incline up, incline down, motion control button on both handles of the treadmill to increase or decrease speed through waving above. The treadmill has 9 grades of inclination and can speed up to 12 km/hour but the participants run on speed from 3-5 Km/hour.

**Yoga group (group B):** This group consisted of twenty women with breast cancer suffering from depression. These women received yoga for 50 minutes 3 times per week for 8 weeks. There are many types of Yoga. Most of these types integrate physical postures and breathing exercises. In the present study, the participants performed balasana pose and Urdhva Mukha Svanasana pose. They participants were given information about the poses and how to perform them. Balasana (Child Pose) is one of the simple and comfortable poses that gently stretch the lower back and hips, enabling the body to relax and relieve stress and depression. Urdhva Mukha Svanasana (Upward-Facing Dog Pose) is done by lying on the floor with face down and legs following the same with the toes facing downward. Palms are placed near the chest on either side with lifting torso and straighten arms and legs. Breathing exercises were also done. Women are asked to inhale slowly and deeply through your nose, first by pushing out their abdomen, thus allowing their diaphragm to move down and their chest to expand.

As they exhale through their nose this allowed their diaphragm to relax by gently pulling in their abdomen and emptying the base of their lungs, then allowed the rest of their chest to deflate.

**Statistical analysis:** The sample size was calculated to be 40 women by using Epi open info program with power 80% and  $\alpha=0.05$ . All data were collected, tabulated and statistically analyzed using SPSS 26.0 for windows (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as the mean  $\pm$  SD & median (range), and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Independent samples Student's t-test was used to compare between two groups of normally distributed variables while paired t test was used to compare between pre and post intervention normally distributed variables within the groups.

Percent of categorical variables were compared between the groups using Chi-square test. All tests were two sided. p-value  $< 0.05$  was considered statistically significant (S), p-value  $\geq 0.05$  was considered statistically insignificant (NS).

**Ethical approval:** A written informed consent was taken from all women. A file having the same number was made to collect all data about the patient and results of investigations done throughout the period of research. Ethical approval was obtained from the institutional review board at faculty of physical therapy, Cairo University before starting the study [No: P.T.REC/012/002819].The study was conducted between January 2020 and March 2021.

**Informed consent:** Informed consent was signed by each woman after explaining the aim and benefits of the study.

**RESULTS**

**Basic characteristics of the studied groups:** As shown in table (1), both groups were matched regarding age, weight, height and BMI with (p>0.05).

**Table 1. Comparing basic characteristics between the studied Groups**

Variables	Group A (exercise) (n=20)	Group B (Yoga) (n=20)	T	P value
Age (years) Mean $\pm$ SD	36.85 $\pm$ 5.66	37.6 $\pm$ 5.01	-0.443	0.66 (NS)
weight (Kg) Mean $\pm$ SD	70.7 $\pm$ 10.97	68.25 $\pm$ 8.9	0.773	0.445(NS)
Height (m) Mean $\pm$ SD	163.7 $\pm$ 5.58	164.2 $\pm$ 4.75	-0.305	0.762(NS)
BMI (kg/m <sup>2</sup> ) Mean $\pm$ SD	26.49 $\pm$ 4.57	25.31 $\pm$ 3.15	0.953	0.347(NS)

Independent sample t test Data are expressed as mean  $\pm$  SD. NS (not significant) p> 0.05

**Table 2. Comparison between mean values of raw score measured pre- and post-treatment in group A (exercise group)**

Variable	Group A	
	Pre treatment	Post Treatment
Depression score Mean $\pm$ SD	58.8 $\pm$ 6.18	42.05 $\pm$ 11.06
T	10.6	
MD	16.75	
Percent of change	27.2%	
P value	<0.001**	

Paired t test \*\*p< 0.01= highly significant

**Comparison between mean values of depression score measured pre and post treatment within each group:** In group A there was a statistical significant decrease in the mean values of depression score measured at post-treatment (42.05±11.06) when compared with its corresponding value at pre-treatment (58.8±6.16) with t value= 10.6 and p value <0.001 [Table 2].

Also, in group B there was a statistical significant decrease in the mean values of depression score measured at post-treatment (50.5±10.01) when compared with its corresponding value at pre-treatment (61.2±6.16) with t value= 5.95 and p value <0.001. [Table 3] The percentage of improvement of depression score was higher in groups A (27.2%) versus in group B (17.48%).

**Table 3. Comparison between mean values of raw score measured pre- and post-treatment in group B (Yoga)**

Variable	Group B	
	Pre treatment	Post treatment
Depression score Mean± SD	61.2±6.16	50.5±10.01
Min-max		
T	5.95	
MD	10.7	
Percent of change	17.48%	
P value	<0.001**	

Paired t test \*\*p<0.01= highly significant.

**Comparison between depression grades measured pre and post-treatment within each group:** As shown in table (4), there was highly statistically significant difference (p<0.001\*\*) between pre and post intervention results of group A 70% of participants became normal after intervention and those with mild depression was 60.0% and after intervention decreased to 25%. Also, there was statistically significant difference (p<0.05\*) between pre and post intervention results of group B 25% of participants became normal after intervention and those with moderate depression was 45% and after intervention decreased to 10% [Table 4].

**Table (4): Comparison between depression grades pre and post treatment within each group**

Depression grades	Group A (exercise) (n=20)		Group B (Yoga) (n=20)	
	Pre	Post	Pre	Post
•Normal	0 (0.0%)	14 (70%)	0 (0.0%)	5 (25%)
•Mild depression	12 (60%)	5 (25%)	11 (55.0%)	13 (65%)
•Moderate depression	8 (40%)	1 (5%)	9 (45%)	2 (10%)
Z value	-4.001		-3.0	
P value	<0.001**		0.003*	

Wilcoxon test p<0.05\* significant p<0.001\*\* highly significant

**Comparison between mean values of depression score between the two studied groups measured pre and post treatment:** Pre-treatment, there was no statistical significant difference between the mean values of depression score in group A (58.8±6.8) and its corresponding value in group B (61.2±6.16) with t value= -1.16 and p value= 0.25 [Table 5] At the other hand at post-treatment, there was a statistical significant decrease in the mean values of depression score in group A (42.05±11.06) when compared with its corresponding value in group B (50.5±10.01) with t value= -2.53 and p value=0.016 [Table 6]

**Table (5): Comparison between mean values of depression score in the two studied groups measured pre-treatment**

Variable	Pre treatment	
	Group A	Group B
Depression score Mean± SD	58.8±6.8	61.2±6.16
t value	-1.16	
P value	0.250 (NS)	

Independent sample t test p> 0.05 (not significant)

**Table (6): Comparison between mean values of depression score in the two studied groups measured post treatment**

Variable	Post treatment	
	Group A	Group B
Depression score Mean± SD	42.05±11.06	50.5±10.01
t value	-2.53	
P value	0.016*	

Independent sample t test \*p< 0.05 significant

**Table (7): Comparison between depression grades pre and post treatment between the studied groups**

Depression grades	Pre treatment		Post treatment	
	Group A	Group B	Group A	Group B
•Normal	0 (0.0%)	0 (0.0%)	14 (70%)	5 (25%)
•Mild depression	12 (60%)	11 (55%)	5 (25%)	13 (65%)
•Moderate depression	8 (40%)	7 (45%)	1 (5%)	2 (10%)
X <sup>2</sup>	0.102		8.15	
P value	0.749 (NS)		0.017*	

Chi square test (X<sup>2</sup>)(NS) non-significant (p>0.05) \*p< 0.05 significant

**Comparison between depression grades measured pre and post-treatment in the two studied groups:** As shown in table (7), there was no statistically significant difference (p>0.05) between pre intervention depression grades of the two groups. On the other hand, there was statistically significant difference (p=0.017\*) when comparing post intervention depression grades between the two groups with 70% of group A was normal while 65% of group B had mild depression.

## DISCUSSION

The present study included forty breast cancer women suffering from depression divided randomly into two groups equal in number, Aerobic exercise group (group A) and Yoga group (group B). Both groups were matched regarding age, weight, height and BMI with (p>0.05). The purpose of this study is to compare between the effect of aerobic exercise and yoga on depression. In the present study, comparison between the mean values of depression score measured pre and post treatment in exercise group (group A) revealed highly statistically significant decrease in the mean values of depression score measured at post-treatment (42.05±11.06) when compared with its corresponding value at pre-treatment (58.8±6.8) (p value <0.001) with percentage of improvement of depression score was (27.2%). The present study agreed with a study which found that exercise leads to significant decreases in fatigue, anxiety and depression in breast cancer patients receiving adjuvant therapy, with greater decreases with low weekly exercise doses. The study stated that a 20-week exercise program comprising a session of resistance training for principal muscle groups and 2 moderate- intensity aerobic sessions per week, each lasting 30 - 45 minutes, would

be optimal in effecting positive mood change in these patients. (9) Patsou et al. also reported that cancer survivors who are engaged with physical activity demonstrated statistically significant lower levels of depressive symptoms when compared with non-exercising control groups (2). This also is consistent with the study of Ramírez-Vélez, et al., which reported that exercise training programs were associated with significant reductions in anxiety, depression and fatigue. They found that concomitant training, at moderate exercise  $\geq 50$  min/week, had benefits on a number of health outcomes, such as fatigue and depression (10). Along with, the study of Courneya et al, which revealed significant improvement in baseline depression levels after exercise ( $P = 0.027$ ) indicating that exercise was effective for managing depressive symptoms in patients with clinical levels of depressive symptoms (11). Dolan et al. also reported significant improvements in depression scores ( $P = 0.019$ ) after a clinical exercise program based on the established cardiac rehabilitation model, but customized for female breast cancer survivors (12).

In addition to, Ergun et al., study which reported significant decreases in depression score and higher quality of life in the supervised exercise group after the exercise program ( $P < 0.05$ ) (13). Research suggests that aerobic exercise has the greatest mood-elevating effects when performed continuously over an extended period of time, where the release of endorphins is responsible for the feel-good effect. In addition to this endorphin-related positive effect, cortisol levels are altered by exercise as 30 minutes of moderate aerobic activity can reduce cortisol levels, higher levels of which are associated with negative affective states. This reduction may partly explain the mood-elevating effects of physical activity. (4) The current study illustrated that in Yoga group (group B), there was a highly statistically significant decrease in the mean values of depression score measured at post-treatment when compared with its corresponding value at pre-treatment (p value  $< 0.00$ ) with percentage of improvement (17.48%). Also, there was statistically significant difference (p $< 0.05^*$ ) between pre and post intervention results of group B with became normal 25% after intervention. The present study agreed with the study of Rao et al., which suggested an overall decrease in self-reported depression and significant decrease in depression scores in the yoga group as compared to controls ( $P < 0.01$ ). (14). These results agreed with the study of Zuo et al. which reported that Yoga is valuable in improving negative moods in patients with breast cancer as anxiety (p  $< 0.001$ ), depression (p  $< 0.001$ ) and distress (p  $< 0.001$ ), and emotional well-being (p  $0.0002$ ) but sustained effects (3months) were only found in depression. (15) In addition to, Armer et al. who reported that mind-body approaches, as yoga, are used by cancer survivors to cope with treatment-related symptoms. Fatigue, depression, and quality of life were assessed. Yoga practice was associated with, statistically significant decrease in fatigue and depression (p value 0.007). The study suggested yoga may be beneficial as a component of treatment for both fatigue and depression in cancer survivors (16). These results agreed with the positive effects reported by the study of Vadiraja et al., that yoga reduces perceived stress ( $P = 0.001$ ), fatigue frequency ( $P < 0.001$ ) and fatigue severity ( $P < 0.001$ ) when compared to supportive therapy (17). Also, the present study was consistent with the study of Cramer et al. which illustrated that Yoga had a positive effect on the quality of life of breast cancer (18). In contrast to our study, the study of Taso et al. illustrated that the yoga exercise effectively reduced fatigue in patients with breast cancer but did not reduce depression or

anxiety. (19) As well as, Cramer et al. reported that yoga improved health-related quality of life, but did not appear to reduce depression or anxiety (20). In the current study, comparison between mean values of depression score between the two studied groups measured pretreatment revealed no statistical significant difference between the groups but post-treatment, the mean values of depression score in group A was significantly less than group B (p value=0.016). Yagli et al. investigated the effects of yoga on the quality of life in patients with cancer and found that all patients' quality of life scores after the yoga and exercise program were better than scores obtained before the yoga and exercise program (p  $< 0.05$ ) but unlike the current study, when the groups were compared in terms of depression, pain, fatigue, and sleep quality, there was statistically different between the groups in favor of Yoga group (p  $< 0.05$ ) (6)

**Study limitation:** Although the study revealed significant difference regarding the main outcome, we still need more studies with larger samples and longer duration of intervention program as we had small sample size with only 8 weeks program.

## CONCLUSION

It is concluded that physical exercise and Yoga are effective supportive interventions in managing depression in breast cancer patients. In addition, physical exercise was found to be superior to Yoga in relieving depression of breast cancer patients. Generally aerobic exercise programs and other modalities as Yoga are better prescribed according to the individual needs, capabilities and preferences.

**Conflict of interest:** No conflict of interest between authors

## REFERENCES

- DeSantis CE, Lin CC, Mariotto AB, Siegel RL, Stein KD, Kramer JL, et al. 2014. Cancer treatment and survivorship statistics. CA: a cancer journal for clinicians. 64(4):252-271.
- Patsou ED, Alexias GD, Anagnostopoulos FG, Karamouzis MV. 2017. Effects of physical activity on depressive symptoms during breast cancer survivorship: a meta-analysis of randomised control trials. *Esmo Open.*,2(5):e000271.
- Bodai BI, Tuso P. Breast cancer survivorship: a comprehensive review of long-term medical issues and lifestyle recommendations. *The Permanente Journal.* 2015; 19(2):48.
- Van Oers HM. Exercise effects on mood in breast cancer patients. *South African Journal of Sports Medicine.* 2013; 25(2):55-59.
- Zhu G, Zhang X, Wang Y, Xiong H, Zhao Y, Sun F. Effects of exercise intervention in breast cancer survivors: a meta-analysis of 33 randomized controlled trails. *Onco Targets Ther.* 2016; 9:2153-68.
- Yagli NV, Ulger O. The effects of yoga on the quality of life and depression in elderly breast cancer patients. *Complementary therapies in clinical practice.* 2015; 21(1):7-10.
- Odynets T, Briskin Y, Todorova V, Bondarenko O. Impact of different exercise interventions on anxiety and depression in breast cancer patients. *Physiotherapy Quarterly.* 2019; 27(4):31-36.

- Kirkby R, Al Saif A, Mohamed GE. Validation of an Arabic translation of the Zung self-rating depression scale. *Annals of Saudi medicine*. 2005; 25(3):205-8.
- Carayol M, Bernard P, Boiché J, Riou F, Mercier B, Cousson-Gélie F, et al. Psychological effect of exercise in women with breast cancer receiving adjuvant therapy: what is the optimal dose needed?. *Annals of oncology*. 2013; 24(2):291-300.
- Ramírez-Vélez R, Zambom-Ferraresi F, García-Hermoso A, Kievisiene J, Rauckiene-Michealsson A, Agostinis-Sobrinho C. Evidence-Based Exercise Recommendations to Improve Mental Wellbeing in Women with Breast Cancer During Active Treatment: A Systematic Review and Meta-Analysis. *Cancers*. 2021; 13(2):264.
- Courneya KS, McKenzie DC, Gelmon K, Mackey JR, Reid RD, Yasui Y, et al. A multicenter randomized trial of the effects of exercise dose and type on psychosocial distress in breast cancer patients undergoing chemotherapy. *Cancer Epidemiology and Prevention Biomarkers*. 2014; 23(5):857-864.
- Dolan LB, Barry D, Petrella T, Davey L, Minnes A, Yantzi A, et al. The cardiac rehabilitation model improves fitness, quality of life, and depression in breast cancer survivors. *Journal of cardiopulmonary rehabilitation and prevention*. 2018; 38(4):246-252.
- Ergun M, Eyigor S, Karaca B, Kisim A, Uslu R. Effects of exercise on angiogenesis and apoptosis-related molecules, quality of life, fatigue and depression in breast cancer patients. *European journal of cancer care*. 2013; 22(5):626-37.
- Rao RM, Raghuram N, Nagendra HR, Kodaganur GS, Bilimagga RS, Shashidhara HP, et al. Effects of a yoga program on mood states, quality of life, and toxicity in breast cancer patients receiving conventional treatment: A randomized controlled trial. *Indian journal of palliative care*. 2017; 23(3):237.
- Zuo XL, Li Q, Gao F, Yang L, Meng FJ. Effects of yoga on negative emotions in patients with breast cancer: a meta-analysis of randomized controlled trials. *International Journal of Nursing Sciences*. 2016; 3(3):299-306.
- Armer JS, Lutgendorf SK. The impact of yoga on fatigue in cancer survivorship: a meta-analysis. *JNCI cancer spectrum*. 2020 (2):pkz098.
- Vadiraja HS, Rao RM, Nagarathna R, Nagendra HR, Patil S, Diwakar RB, et al. Effects of yoga in managing fatigue in breast cancer patients: A randomized controlled trial. *Indian journal of palliative care*. 2017; 23(3):247.
- Cramer H, Lange S, Klose P, Paul A, Dobos G. Yoga for breast cancer patients and survivors: a systematic review and meta-analysis. *BMC cancer*. 2012; 12(1):1-3.
- Taso CJ, Lin HS, Lin WL, Chen SM, Huang WT, Chen SW. The effect of yoga exercise on improving depression, anxiety, and fatigue in women with breast cancer: a randomized controlled trial. *Journal of Nursing Research*. 2014; 22(3):155-164.
- Cramer H, Lauche R, Klose P, Lange S, Langhorst J, Dobos GJ. Yoga for improving health-related quality of life, mental health and cancer-related symptoms in women diagnosed with breast cancer. *Cochrane Database of Systematic Reviews*. 2017(1).

\*\*\*\*\*