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Comparison of the Effects of Aerobic Exercise and Acupressure in Reducing Hot Flashes in Breast Cancer Survivors

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Abstract

Objectives: Hot flash is a prevalent health problem among breast cancer survivors. Due to the prohibition of estrogen use in patients affected by breast cancer, the treatment of hot flashes is a major challenge in these patients. In this regard, the objective of this study was to compare the effect of exercise and acupressure on decreasing hot flashes in patients with breast cancer.

Materials and Methods: This randomized controlled clinical trial was carried out on 99 women with breast cancer referring to two divisions of the Oncology Clinic of Tabriz Medical Sciences University in Iran. Participants were assigned to exercise, acupressure, and control through random selection. For the members of the acupressure group, acupressure was applied to the HE7, SP6, and HE GU points by an acupuncturist for 15 minutes three days a week during an 8-week period. Regarding the exercise group, a moderate 60-minute aerobic exercise program was designed and implemented 3 days a week for 8 weeks. Finally, the control group was awarded general education on lifestyle changes in order to reduce hot flashes.

Results: Data analysis results showed a reduction in the mean of hot flash scores in both acupressure and exercise groups in the 4th and 8th weeks compared to the control group ($P<0.001$). However, acupressure and exercise did not significantly reduce the hot flash scores in either group.

Conclusions: In general, the results revealed that exercise and acupressure are two effective methods with negligible side effects for diminishing hot flashes in women suffering from breast cancer. Considering the prevalence of hot flashes in breast cancer patients, the use of these two methods can be a good alternative to medical treatments for controlling and reducing hot flashes.

Keywords: Hot flashes, Acupressure, Exercise, Breast cancer

Introduction

Breast cancer is the most prevalent cancer among women (1). Globally, about 1.7 million new cases of breast cancer and 521 900 deaths in this regard were registered in 2012 (2). Breast cancer in Iran accounts for one-third of all cancers and is the second largest cancer in women after cervix cancer. In addition, the incidence of breast cancer in Iran is 22 cases per 100 000, and its prevalence is 120 cases per 100 000 people (3). The main methods for treating breast cancer are chemotherapy and radiotherapy. Tamoxifen is also a major selective estrogen receptor modulator in the treatment of breast cancer (4). It is noteworthy that most breast cancer malignancies are estrogen hormone-receptor-positive, and these tumors are effectively treated with hormonal drugs such as tamoxifen or aromatase inhibitors that prevent cell proliferation (5). Tamoxifen has long been publicly used as the main adjuvant therapy for breast cancer (6). By intervening in the function of receptors, tamoxifen successfully prevents breast cancer (7) and reduces relapse and complications in cancer survivors by 75% (8). The major side effects of tamoxifen are similar to menopausal symptoms (4), one of which is the hot flash. Vasomotor symptoms are also one of the quite common adverse effects of breast cancer treatment (9,10). Owing to the considerable proportion of breast cancer patients and tamoxifen recipients, the treatment of hot flash in these individuals is important and includes estrogen replacement therapy (ERT). The use of ERT is probably related to the risk of breast cancer and prohibited in patients with breast cancer. Therefore, other safe methods should be used to reduce hot flashes (11), including keeping the body cool and doing daily (12,13) and regular respiratory exercises that have positive outcomes without any side effects (14).

Regular exercise is one of the safest, most effective, and reliable practices that increases general health while reducing the risk of chronic lifestyle-related diseases. Further, continuous light and heavy exercises might reduce the severity and incidence of hot flashes (15).

Another alternative treatment for alleviating hot flashes is acupressure, which is a non-invasive and easy technique with therapeutic goals and reduces vasomotor symptoms

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in menopausal women (16,17). Acupressure is one of the divisions of acupuncture in which physical pressure (usually by fingers) is used on specific points instead of inserting needles. However, limited studies have focused on acupressure and its effect on hot flashes.

Considering the prevalence of breast cancer and the menopausal-like adverse effects of breast cancer drugs, the prohibition of ERT in these patients, the effectiveness of exercise and acupressure on hot flashes, and the lack of a comparison study in this regard, this study attempted to compare the effect of exercise with acupressure on hot flashes in women with breast cancer treated with adjuvant drugs.

Materials and Methods

This randomized controlled clinical trial was conducted 99 women with breast cancer referring to two divisions of the Oncology Clinic of Tabriz Medical Sciences University in Iran. The sampling of subjects started after receiving the ethics code from the Ethics Committee of Tabriz Medical Sciences University (IR.TBZMED.REC.1396.926) and registering the study at the Iranian Center for Clinical Trials (identifier: IRCT20150424021917N8; https://www.irct.ir/trial/28933). The inclusion criteria were created, and qualified participants were invited to the orientation session. All participants received the necessary information and written informed consent, and were followed up by telephone during the study.

Inclusion and Exclusion Criteria

Subjects aged 18-45 years old were selected for the study based on conditions such as hot flashes more than twice a week for 6 weeks, body mass index (BMI) less than 30, no history of hot flashes before the disease, no movement disorders, and completion of chemotherapy/radiotherapy 8 weeks before study initiation. On the other hand, subjects were excluded from the study if they had a BMI ≥30, underwent acupuncture 2 weeks before the study, were ≥45 years old, suffered from cardiovascular diseases, consumed any medication for hot flash treatment, hyperthyroidism, and physical activity limitation, and performed any regular or professional exercise.

Data Collection Tool

A demographic questionnaire containing 13 questions and a daily hot flash chart was created based on the aim of the study. This chart is commonly used in clinical trials and measures hot flashes with mild, moderate, severe, and very severe intensity.

Mild hot flash (score 1) is when the attacks last less than 5 minutes and the individual feels warm and uncomfortable.

Moderate hot flashes (score 2) last for 15 minutes and the head, neck, ears, or the whole body feels hot. Sweating, dry mouth, and changes in the heart rate can occur as well. In addition, the individual feels tired and might have to remove her clothes, use a fan, and the like, or hot flashes wake her up at night.

Further, severe hot flashes (score 3) last for up to 20 minutes. The heart rate changes and the person feels warm making him/her prone to fainting. Panic attacks, prolific sweating, and chest tightness might occur as well. The person has to always use air conditioning and keep the house cool.

Furthermore, very severe hot flashes (score 4) continues for more than 45 minutes. The person has prolific sweating, difficulty breathing, and a feeling of going to faint. Foot cramps, tingling in the body, and tachycardia may occur as well. Moreover, the individual feels intense stress, often wakes up at night, has to change her bedding and clothes, and takes a cold shower.

Participants completed the hot flash daily chart for 3 days before the intervention and at weeks 4 and 8. To calculate the final score, the average number of hot flashes recorded on the 3rd day was multiplied by the severity score (18). Then, the scores of the hot flashes of the daily chart were calculated and averaged before the intervention and at weeks 4 and 8 after the intervention. The reliability of the questionnaire was assessed through a test-retest method on 10 subjects and the intraclass correlation coefficient.

Sample Size

The sample size (33 subjects in each group) was calculated based on the study of Borud et al (19) using the G*Power software, assuming a 30% reduction in the hot flash frequency, and considering a 10% dropout in each group.

After obtaining informed consent, pre-test questionnaires were distributed, and the subjects were asked to complete and sign them.

Randomization and Masking

Qualified women were assigned to three groups of exercise, acupressure, and control using random allocation software and through random grouping with six and nine groups and a 1:1:1 ratio. To hide the allocation, the type of intervention was written on a paper and placed inside opaque envelopes which were sequentially numbered and assigned to participants, respectively. Then, participants were assigned through the random selection of exercise, acupressure, and control groups.

Intervention Protocol

For the acupressure group, firm pressure (without causing pain) was applied three days a week for 15 minutes during an 8-week period by the acupuncturist to the following points: HE7 (on the wrist between the ulnar and pisiform), HE GU on the left hand (the most prominent part of the muscle placed between the thumb and the index finger), and Sp6 on the left foot (four fingers above the ankle).

Regarding the exercise group, a moderate aerobic exercise program in a fitness center was designed 3 days a week for 60 minutes during an 8-week period, which

was supervised by a physical trainer and a researcher. Participants completed the hot flash daily chart in weeks 4 and 8 again.

For the control group, there was no intervention, but they continued receiving general education in the oncology clinic about reducing hot flashes through lifestyle changes and the situation of the recurrence of breast cancer.

Data Analysis

The data were analyzed by SPSS software, version 13. ANOVA, chi-square test, and chi-square rounding were used to compare the social-demographic characteristics of the three groups. Further, the normality of quantitative data and hot flash scores was assessed by the Shapiro-Wilk test. Quantitative data and hot flash scores had a normal distribution. To compare and adjust the hot flash scores between the study groups in the 4th and 8th weeks, the general linear model test was used taking into account the basal level of hot flashes as a confounding factor. A $P < 0.05$ was considered statistically significant. All analyzes were performed based on the intention to treat concept.

Results

This study was conducted from January 2018 to January 2019 at two medical education centers in Tabriz. In general, 380 people were assessed for eligibility, and eventually, 99 of them participated in this study (the remaining individuals were uninterested in participating), including 33 cases in each of the acupressure, exercise, and control groups (Figure 1). The mean ± standard deviation (SD = 5.4) age of the participants was 38.4 years old. Furthermore, 40.2% of participants had high school diplomas and 77.8% of them were housewives. Moreover, 51.5% (SD = 1.8) of women had an average income, and the average number of hot flashes before the intervention was 1.5 times a day (SD = 1.8). Additionally, the mean daily hot flash score before the intervention was 10.6 (SD = 4.0). Finally, the frequency and scores of hot flashes in all three groups had a normal distribution. Table 1 lists participants' demographic data, which were homogenous.

The result of the ANOVA test revealed a significant value for the hot flash score between the three groups before the intervention. As a result, this value was considered interactional. Table 2 presents a comparison of the frequency of hot flashes between the groups. Based on data analysis, a significant reduction was observed in the mean hot flash score in the two groups of acupressure and exercise in the 4th and 8th weeks compared to the control group. However, there was no significant difference between the exercise and acupressure groups in terms of a reduction in the hot flash score (Table 3).

Discussion

The aim of this study was to evaluate the efficacy of non-pharmacological methods in reducing hot flashes in women who had limited use of drugs due to the risk of cancer recurrence. The primary issue was hot flashes. The hypothesis was that there was no difference in the effectiveness of the two non-pharmacological methods.

The findings of the present study showed that acupressure and exercise have a significant effect with minimal side effects on the reduction of hot flashes in

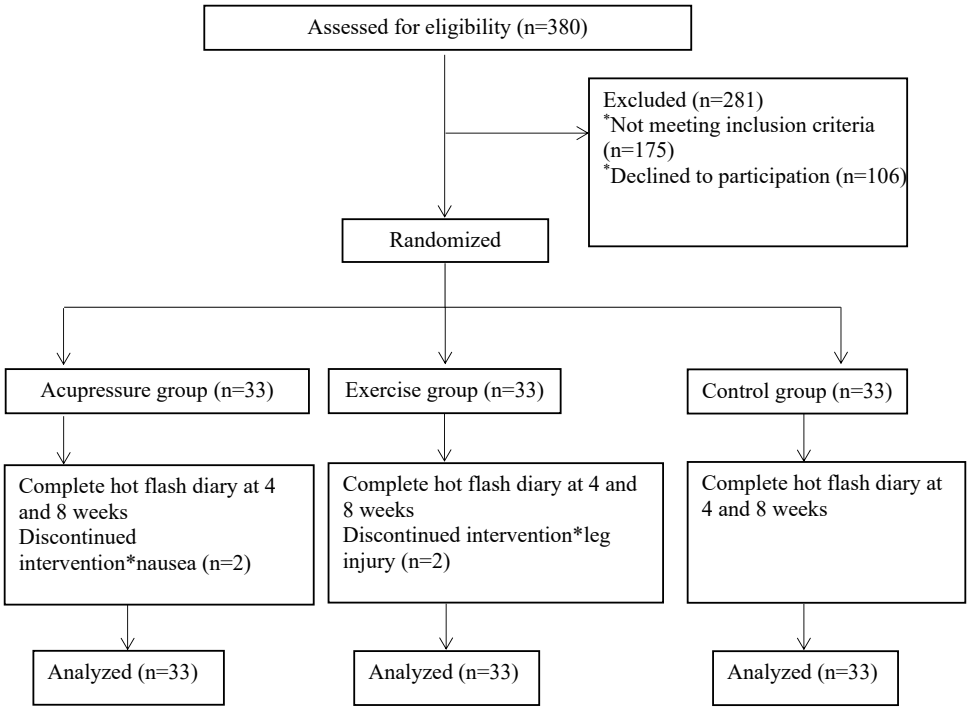

Figure 1. Flow chart of the Participation Through Each Stage of the Trial.

Table 1. Demographic Characteristics of the Study Groups

	Demographic Information	Exercise		Acupressure		Control		*P* Value
		No.	%	No.	%	No.	%	
Age	18-30	1	3.0%	7	21.1%	8	24.2%	0.065
	31-40	14	42.4%	10	30.0%	15	45.4%	
	41-45	18	54.4%	17	51.1%	9	27.2%	
BMI	≤18.5	-	-	-	-	-	-	0.184
	18.5-24.9	8	16.7%	11	37.9%	9	30.0%	
	25-30	25	88.3%	18	62.1%	21	70.0%	
Literacy	Primary school (<9 years formal education)	3	9.1%	2	5.9%	1	3.1%	0.196
	High school (9-12 years formal education)	9	2.3%	7	20.6%	13	40.6%	
	High school diploma/academic (>12 years formal education)	17	51.1%	14	41.2%	9	28.1%	
	University	4	12.1%	11	32.4%	9	28.1%	
Job	Housewife	30	90.0%	26	76.5%	21	65.6%	0.048
	Employee	3	9.1%	8	23.5%	11	34.4%	
Income	Sufficient	7	21.9%	15	44.1%	18	25.0%	0.294
	Average	18	56.3%	14	41.2%	19	59%	
	Insufficient	7	21.9%	5	14.7%	5	15.6%	

Note. BMI: body mass index.

Table 2. Comparison of Hot Flash Frequencies Between the Groups

Study Groups	Before Intervention Mean (SD)	After Intervention (4 Weeks) Mean (SD)	After Intervention (8 Weeks) Mean (SD)	*P* Value*
Acupressure (n=33)	11.9 (3.6)	7.5 (3.3)	7.2 (3.7)	<0.001
Exercise (n=33)	10.3 (3.4)	7.7 (3.5)	6.9 (3.1)	<0.001
Control (n=33)	9.4 (4.4)	10.3 (4.8)	10.2 (5.1)	0.111

Note. SD: Standard deviation; **P* value was derived by the repeated-measure test.

Table 3. Comparison of Hot Flash Scores Between the Study Groups

Groups Comparison	Before Intervention		After Intervention (4 weeks)		After Intervention (8 weeks)	
	AMD (95% CI)	*P* Value	AMD (95% CI)	*P* Value	AMD (95% CI)	*P* Value
Acupressure vs. control	2.5 (0.2 - 4.8)	0.028	-4.7 (-6.2 - 3.2)	0.001<	-4.9 (-6.5 - -3.2)	0.001<
Exercise vs. control	0.9 (-1.4 - 3.2)	0.981	-3.4 (-4.9 - -1.9)	0.001<	-4.1 (-5.8 - -2.5)	0.001<
Acupressure vs. exercise	1.6 (-0.7 - 3.9)	0.281	-1.3 (-2.8 - 0.2)	0.121	-0.7 (-2.3 - 0.9)	0.660

Note. AMD: Adjusted mean difference; CI: Confidence interval; P-value was derived by the general linear model. In addition, the base line hot flash score was indicated as a confounder.

women with cancer. However, they do not differ notably in the reduction of hot flashes. Therefore, our hypothesis was supported, even though the difference in averages represented that acupressure appears to be slightly more effective than exercise at the end of weeks 4 and 8. Both acupressure and exercise were more effective in week 8 compared to week 4 (Figure 2).

Different studies on the effect of physical exercise on reducing hot flashes have shown different results. The intensity of exercise can be one of the determinants of the effectiveness of exercise on the severity and frequency of hot flashes.

It seems that, during intense exercise, norepinephrine and serotonin levels increase and the β-endorphin volume (which decreases with a decline in estrogen levels) does not drop significantly (20). Limited studies have focused on the effect of acupressure on hot flashes, and some studies showed a positive effect in this regard (21). For example, Zhou et al found that auricular acupressure can decrease follicle-stimulating hormone while increasing the estradiol level in bilateral ovariectomized Chines women (22). However, other study reported no positive outcome in this regard. Nonetheless, the mechanism of acupressure in reducing vasomotor symptoms remains unknown. Based on previous evidence, ovariectomized rat acupuncture (not acupressure) increases the numbers of estrogen receptor mRNA. Additionally, it is possible that acupressure, like acupuncture, increases estrogen levels in menopausal women (23).

Several confounders can interfere in the effect of exercise on vasomotor symptoms. For instance, inter-personal variability including genetic differences, race, baseline

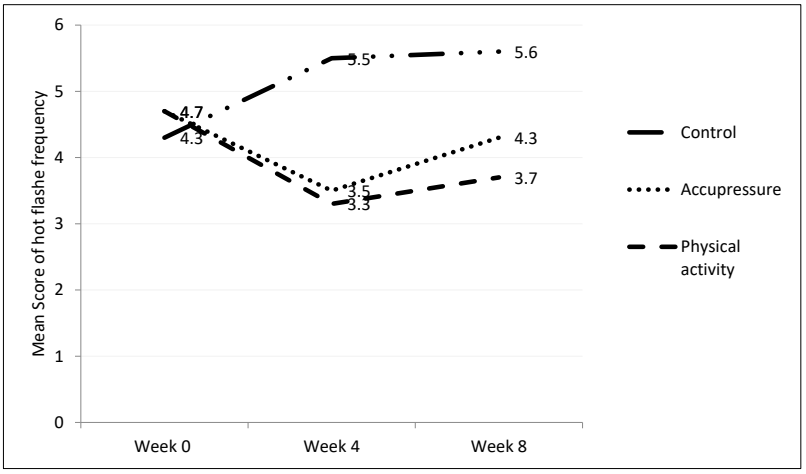

Figure 2. Hot flash frequency between study groups before, 4 weeks and 8 weeks after intervention.

fitness, self-efficacy, and perceived symptom copping can modify and yet change the effect of the exercise on vasomotor symptoms (24-26).

Nevertheless, the effect of exercise on hot flash frequency and intensity remains a controversial issue. One theory insists on the role of intense exercise in elevated norepinephrine and serotonin, indicating that it leads to an increase in the endorphin volume while decreasing the hot flash. On the contrary, the other theory indicated an increase in the core temperature of the body following the exercise and thus an increase in the intensity of the hot flash, especially in women with a narrow thermoregulation zone in the hypothalamus (27).

According to the results of this study, acupressure and exercise are non-invasive, painless, and low-risk methods for improving hot flashes in women, which can be used in women with breast cancer as well. In this study, a few side effects were reported by the subjects in the interventional groups. For example, one participant in the acupressure group experienced an increase in the severity and number of hot flashes after the procedure and was consequently removed from the study. In addition, another subject in the exercise group was excluded from the study due to an ankle injury.

Strengths and Weaknesses of the Study

One of the strengths of the study was the correct methodology including randomization and allocation concealment. According to the literature review conducted by the research team, there has been no study regarding comparing the effectiveness of exercise and acupressure for diminishing hot flashes in women with breast cancer. Therefore, the uniqueness of the present study counts for another strength.

However, the present study has a number of weaknesses including using a questionnaire which relies on the memory of the subjects for reporting the number and intensity of hot flashes instead of using objective methods such as skin conductors. Moreover, given that one of the inclusion criteria was the completion of radiotherapy and chemotherapy courses during an 8-week period before the study, subjects in the exercise group might have been too weak or lethargic to adequately participate in the work-out routines.

Conclusions

Women with breast cancer should use drugs that have significant side effects including hot flashes. Due to the nature of the disease, treating these complications with medical treatments is a great challenge for doctors. The results of this study showed that exercise and acupressure are two effective methods with negligible side effects regarding reducing hot flashes in women affected by breast cancer. None of the methods was more effective than the other. Eventually, due to the prevalence of hot flashes in breast cancer survivors and the concerns for using drug therapies, the use of acupressure and exercise can be a suitable alternative for controlling and reducing hot flashes in these women.

Suggestion for Further Research

Further study with a larger sample size is recommended although using a skin conductor would be a better way for evaluating hot flash.

Conflict of Interests

Authors have no conflict of interests.

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