DOI: http://dx.doi.org/10.22122/ijbmc.v9isp.412 Published by Vesnu Publications

International Journal of Body, Mind and Culture

Comparing the Effectiveness of Exercise and Music Therapy on Anxiety and Depression in Patients with Breast Cancer

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Quantitative Study

Abstract

Background: Breast cancer is the most common cancer in women, and in addition to clinical treatments, these patients must improve their mental health. The current study aimed to compare the effectiveness of exercise therapy and music therapy on anxiety and depression in patients with breast cancer.

Methods: The current study was a quasi-experimental research with a pre-test and post-test design. In 2020, 241 patients with breast cancer were referred to the Basra Oncology Center, Basra, Iraq. Among them, 72 people were randomly divided into two intervention groups and a control group based on simple random sampling (24 people in each group). The Hospital Anxiety and Depression Scale (HADS) was administered to all three groups in pre-test and post-test. The intervention groups participated in exercise and music therapy, whereas the control group did not. Data were analyzed by analysis of covariance (ANCOVA) with SPSS software.

Results: Exercise and music-based therapies reduced anxiety ($F = 14.076$, $P < 0.001$) and depression ($F = 26.641$, $P < 0.001$) in patients with breast cancer. In addition, the variables of anxiety ($P = 0.214$) and depression ($P = 0.148$) did not significantly differ between the two approaches.

Conclusion: Exercise and music-based therapies can significantly alleviate anxiety and depression of patients with breast cancer, enhancing their quality of life. In the treatment and care departments, it is suggested that these treatments be viewed as non-invasive interventions.

Keywords: Breast cancer; Anxiety; Depression; Exercise therapy; Music therapy

Citation: Shehab AF, Farhan OHH, Alkhafaje WK, Ali MK, Alaraji MK, Hindi AAKH. **Comparing the Effectiveness of Exercise and Music Therapy on Anxiety and Depression in Patients with Breast Cancer.** Int J Body Mind Culture 2022; 9(Special Issue): 34-43.

Received: 23 May 2022
Accepted: 30 June 2022

Introduction

The increasing prevalence of cancer in recent years and its effects on various physical, psychological, and social dimensions of human life has led to its recognition as a major health problem of the modern era (Poort et al., 2021). Breast cancer is the most common cancer among women in many countries worldwide. Patients with breast cancer are expected to live the longest of any patients with cancer. Given the incidence and prevalence of breast cancer, the high cost of treatment, and the fact that it is one of the most treatable cancers if detected early, its significance becomes even clearer. Breast cancer is a disease that has severe psychological consequences because the subject of death causes the patient fear and anxiety (Invernizzi, de Sire, Sajjadi, Venetis, Gennari, & Fusco, 2021). In the face of this disease and a cancer diagnosis, the patient goes through several psychological stages and desperately requires support. According to research, psychological support is a critical and multifaceted need that should be provided to clients on an ongoing basis. Nurses and physicians often prioritize physical support, but psychological support is also critical (Deng, Xie, Liu, Li, & Xiao, 2022).

Once people are aware of their illness, they are more likely to experience chronic depression and anxiety. Patients with breast cancer are more likely to suffer from depression and anxiety. Depressed people are more likely to suffer long-term health problems and social isolation. Moreover, the post-disease complications are more severe than those of other illnesses (Dennett, Zappa, Wong, Ting, Williams, & Peiris, 2021). The onset of anxiety symptoms impairs a patient's ability to recover and adapt, whereas cancer-related depression is a traumatic emotional response following a cancer diagnosis or during treatment. Depression in patients with cancer causes an increase in the stress caused by the disease and its treatments and a reduction in immune function. Therefore, the study of depression and anxiety in patients is a crucial variable in treating women with breast cancer, necessitating the consideration of psychosocial care for these patients (Adams et al., 2021).

In addition to clinical issues, it is necessary to consider complementary and non-adjuvant treatments when addressing cancer and its treatment. Exercise and music therapy are non-drug therapies used to improve the psychological state of patients. Physical activity fosters mental growth and creativity and reduces mental susceptibility to depression and anxiety (Ferdosi, Afshar, Sharbafchi, & Aghili-Dehkordi, 2018; Scruth, 2021). Exercise is recognized in many parts of the world as a valuable tool for maintaining the mental health and well-being of humans, strengthening and enhancing physical fitness, and enhancing strength, speed, coordination between nerves and muscles, flexibility, and agility (Zaorsky, Allenby, Lin, Rosenberg, Simone, & Schmitz, 2021). Music is an art form that expresses human feeling, emotion, perception, and cognition without language (Jia et al., 2021). Because rhythm and melody, the two fundamental elements of music, have existed in human nature, the use of music by humans has been effortless and accessible (Saghaei & Mostafazadeh, 2019). Music therapy uses music to respond to emotional, mental, and social tendencies promptly (Kievisiene, Jautakyte, Rauckiene-Michaelsson, Fatkulina, & Agostinis-Sobrinho, 2021; Yang et al., 2021).

Cancer-related psychological stress causes anxiety and depression in patients, and failure to reduce and treat these reactions lengthens the disease hospital stay, disrupts medical treatment, and reduces the chances and survival time (Murray, Bennett, Bezak, & Perry, 2022). As a result, early detection and treatment of psychological problems in

patients with cancer are critical. Furthermore, as patients with cancer grow, developing soothing approaches for them is an urgent and tangible need (Diaz-Balboa et al., 2021). According to the materials presented, non-pharmacological treatment methods have attracted the attention of various patients and are used as a supplement in acute cases alongside drug treatments (Bijan & Behzadipour, 2022). Complementary therapies are holistic treatments that improve patients' physical and mental health. Exercise and music therapy are distinguished from other treatment methods by the therapist's limited involvement in the treatment process and their ease of implementation in the short term (Michael, Lehrer, Schmitz, & Zaorsky, 2021).

The results of other studies show that exercise can help patients with breast cancer reduce their anxiety and depression symptoms and generally improve their mental health. It is also worth noting that there is no evidence that exercise therapy impacts the psychological aspects of a patient's recovery. Long-term continuous exercise with endorphin secretion and euphoria, on the other hand, appears to have better psychological effects, according to some theories. Studies have shown that regular and organized exercise has many positive effects on reducing negative psychological and positive aspects of one's self-confidence. According to Prugger et al. (2017), patients with severe depressive symptoms engage in significantly less regular physical activity than those without; they also found that patients with mental health issues were less likely to exercise regularly. After reviewing 14 studies (some with a significant reduction in symptoms and others with a common effect), Verschueren et al. (2018) concluded that exercise impacted anxiety and depression. Pourafkari et al. (2016) have shown that a combination of exercise and psychological counseling can reduce anxiety and depression in patients.

Due to the rising incidence of breast cancer in women and its negative effects on patients' psyches, it is imperative that, in addition to clinical treatment, measures are taken to improve the psychological condition of patients. Given the high prevalence of breast cancer among women and the high cost of clinical treatments, the study requires the investigation of alternative treatments. The current study aimed to compare the effectiveness of exercise and music therapy on anxiety and depression in patients with breast cancer. One of the novel aspects of the current study is using two non-pharmacological treatments and comparing results affecting the rate of anxiety and depression in patients with breast cancer.

Methods

The current study used quasi-experimental research with a pre-test and post-test design. The statistical population comprised 241 patients with breast cancer referred to the Basra Oncology Center, Basra, Iraq, in 2020. Utilizing the simple random sampling, 72 individuals were selected and randomly divided into three groups of 24 individuals, two groups of exercise intervention and music therapy and a control group. Inclusion criteria included a definitive breast cancer diagnosis within several months of the onset of the disease, age between 30 and 55, a minimum level of literacy, not using anti-anxiety and anti-depression medications, absence of other physical and mental illnesses, and absence of acute physical and mental problems. Exclusion criteria included refusal to participate in the study, cancellation of work, patient misery, not participating in treatment sessions, and absence from more than two sessions. Individual sessions were held for the intervention group to interview and recount the study's objectives. After agreeing to participate in the study, the group's conditions (number of group members, participant conditions, and desired

group principles such as confidentiality) were explained. An experienced questioner completed the anxiety questionnaire for all participants after justifying all participants. All participants were told what they needed to know about the study goals and how it would be done, that they would not be forced to participate and they could choose. Established research ethics safeguarded participants' rights. In addition, they were assured that the collected personal information would be kept confidential and the published data would be analyzed anonymously in groups. The Ethics Committee of the Basra Medical College has approved the present study.

The Hospital Anxiety and Depression Scale (HADS) was utilized in this study. This test is a 1937 standard form developed by Zigmond and Snaith (Montazeri, Vahdaninia, Ebrahimi, & Jarvandi, 2003). Since 1996, the current version has been used in numerous studies on anxiety and depression in various aspects of cancer and chronic patients' quality of life. The content validity of the questionnaire was determined by comparing the questions to the Beck Depression Inventory (BDI) and the General Health Questionnaire (GHQ) as a measure of anxiety (SATI), as well as the feedback of several health professionals before the questionnaire was approved. Validity was determined through retesting and a Cronbach's alpha coefficient greater than 0.70. This questionnaire consists of 14 questions, each with four possible answers, and the maximum anxiety score is 21. A subscale score of 11 or more is indicative of a psychological disorder. While a score of 8 to 10 indicates an intermediate state, a score of 0 to 7 indicates a normal state.

Using the HADS, a pre-test was administered to each of the three research groups following a random assignment of samples. Two sessions per week were then devoted to music therapy (30 minutes per session) and exercise therapy (30 minutes per session). During this period, the control group was placed on a waiting list and received only standard medical treatments. After the treatment sessions, the HADS was administered to all three groups during the post-test state.

The exercise therapy intervention group exercise program, designed and implemented following the schedule in table 1, was similar to the program of Wisloff et al. (2007) and the American College of Sports Medicine (ACSM) standards. The action was taken based on the patient's initial condition and the exercise test results recorded on the patient's file. Each person's heart rate range, level and intensity or rate of speed on the treadmill, as well as resistance or watts of hand ergometers and stationary bikes were recorded on the exercise control sheet in the patient's file. Depending on the circumstances, patients rested for 3 to 10 minutes between periods of use.

Soft nonverbal music was also used for each eligible individual in the music therapy group. The patients in this group listened to one of the four types of music in the music box with headphones for 30 minutes based on their interests. Table 2 provides a summary of music therapy educational intervention activities.

Table 1. A summary of exercise therapy intervention activities

Session	Content
1	Using a 30% manual ergometer for 15 minutes and a 10-watt stationary bike for 15 minutes
2	Using a 40% manual ergometer for 15 minutes and a 10-watt stationary bike for 15 minutes
3	Using a 40% manual ergometer for 15 minutes and a 15-watt stationary bike for 15 minutes
4	Using a 50% manual ergometer for 15 minutes and a 15-watt stationary bike for 15 minutes
5	Using a 50% manual ergometer for 15 minutes and a 20-watt stationary bike for 15 minutes
6	Using a 60% manual ergometer for 15 minutes and a 20-watt stationary bike for 15 minutes
7	Using a 60% manual ergometer for 15 minutes and a 25-watt stationary bike for 15 minutes
8	Using a 70% manual ergometer for 15 minutes and a 25-watt stationary bike for 15 minutes

Table 2. A summary of music therapy intervention educational activities

Session	Content
1	Listening to uplifting non-verbal piano music
2	Recounting feelings of physical and mental fatigue along with playing soothing piano pieces
3	Playing soothing piano pieces and encouraging the patient to talk about feelings and worries
4	Playing an uplifting non-verbal piece along with reciting songs to sympathize with the patient
5	Playing soothing piano pieces while encouraging the patient to harmonize with the music
6	Playing soothing piano pieces while encouraging the patient to whisper songs in their description
7	Playing soothing piano pieces and discussing feelings, thoughts, or memories related to the lyrics
8	Performing active and inactive musical activities in the form of writing text and drawing

SPSS software (version 21, IBM Corporation, Armonk, NY, USA) was used to analyze the data, and the mean and standard deviation (SD) were employed in the descriptive section. Then, a multivariate analysis of covariance (MANCOVA) at a significance level of 0.05 was performed.

Results

The mean status and SD of the age for individuals in the exercise therapy (46.17 ± 3.28), music therapy (47.23 ± 3.19), and control (48.07 ± 3.49) groups were determined using descriptive statistics. Table 3 presents the mean and SD of anxiety and depression variable pre-test and post-test scores for all three groups. This table provides the results of the Shapiro-Wilk test for determining the normality of the distribution of variables within groups. According to table 3, the results of the Shapiro-Wilk test for the variables are not statistically significant; therefore, it can be concluded that their distribution is normal.

A MANCOVA was performed, and the effect of exercise therapy and music therapy on anxiety and depression in patients with breast cancer was compared. The test results demonstrated the homogeneity of the regression slope between the pre-test and post-test for anxiety and depression in the intervention and control groups, indicating that the regression slope was equivalent between the two groups ($F = 1.146$, $P > 0.05$). The Levene's test to examine the homogeneity of variance of dependent variables in groups revealed that the variances of anxiety ($F = 0.938$, $P > 0.05$) and depression ($F = 1.467$, $P > 0.05$) variables in groups were equal. The Box Test results to compare the parity of the covariance matrices of the dependent variables between the test and control groups revealed that the covariance matrices of the dependent variables were identical ($F = 1.029$, $P > 0.05$).

Table 3. Descriptive indicators of pretest-posttest scores of anxiety and depression variables in test and control groups

Variable	State	Group	Mean ± SD	Shapiro-Wilk	P-value
Anxiety	Pre-test	Exercise therapy	14.37 ± 2.18	0.673	0.732
		Music therapy	14.71 ± 2.43	1.076	0.416
		Control	14.62 ± 2.27	1.119	0.645
	Post-test	Exercise therapy	4.39 ± 1.24	0.427	0.152
		Music therapy	5.72 ± 1.67	1.251	0.348
		Control	14.79 ± 2.64	1.113	0.257
Depression	Pre-test	Exercise therapy	15.18 ± 2.53	1.034	0.943
		Music therapy	15.39 ± 2.41	1.016	0.517
		Control	15.07 ± 2.17	0.418	0.651
	Post-test	Exercise therapy	5.26 ± 1.70	1.137	0.243
		Music therapy	5.83 ± 1.76	0.513	0.472
		Control	14.73 ± 2.34	1.049	0.391

SD: Standard deviation

The Bartlett's test determined that the relationship between these components was significant (P < 0.01). After examining the assumptions of MANCOVA, the test results revealed a statistically significant difference in the variables of anxiety and depression between the two groups (P < 0.01). Table 4 displays the results of a one-way analysis of covariance (ANCOVA) to determine which characteristics of the intervention and control groups differ.

The F statistic was significant for the variables of depression and anxiety, according to table 4. These results indicated a significant difference in these variables between the groups. In addition, the effect size indicated that group membership accounted for 40% of the changes in anxiety and 50% of the changes in depression. The Bonferroni post-hoc test was used to compare the pairs of groups, and the results are shown in table 5.

The Bonferroni post-hoc test presented in table 5 showed that exercise and music therapy effectively reduced anxiety and depression scores in patients with breast cancer. There was no significant difference between the two treatments regarding their efficacy.

Discussion

The current study aimed to compare the effectiveness of exercise and music therapy for anxiety and depression in patients with breast cancer. The post-test phase scores of anxiety and depression variables in the experimental group decreased following the presentation of exercise therapy and music therapy. This treatment had significant positive effects on reducing anxiety and depression in the studied patients. The current study also found no difference in the effectiveness of exercise and music therapy in reducing anxiety and depression in patients with breast cancer. The findings of this study are consistent with previous research in this field. Wan et al. (2009) discovered that music therapy could induce pleasure, comfort, and mood swings and alleviate the anxiety and mood of patients with cancer. Under the influence of music, the study by Jasemi et al. (2016) revealed a significant decrease in depression and anxiety among patients with cancer in the intervention group. In light of those mentioned above, it can be concluded that music positively affects human emotions and enhances the outcomes and effects of therapeutic interventions. By listening to music, patients become calmer, and in this state, their nervous system functions become more regular. Additionally, music increases the waves of mental relaxation and can create a relaxing environment. Besides, activating the frontal lobe in both hemispheres of the cerebral cortex increases cerebral consciousness and, ultimately, cognitive-behavioral outputs (Deng et al., 2022).

Some studies have shown exercise to be more long-lasting and effective than other forms of treatment. The effects of 12 weeks of exercise training in a counseling group on 106 heart patients with acute and depressive stroke, anxiety, or fitness were studied by Stern et al. (1983) in a controlled study.

Table 4. Differences in anxiety and depression variables between intervention and control groups using one-way analysis of covariance (ANCOVA)

Variable	Source of change	SS	df	MS	F	P-value	Eta
Anxiety	Group	73.413	2	36.707	14.076	< 0.001	0.416
	Error	98.152	38	2.583	-	-	-
Depression	Group	138.461	2	69.231	26.641	< 0.001	0.548
	Error	176.247	38	4.638	-	-	-

SS: Sum of squares; df: Degree of freedom; MS: Mean squares

Table 5. Bonferroni post-hoc test results

Variable	Couple comparison	Mean difference	Error	P-value
Anxiety	Control-exercise	10.40 ± 1.79	0.561	< 0.001
	Control-music	9.07 ± 1.64	0.548	< 0.001
	Music-exercise	1.33 ± 0.42	0.553	0.214
Depression	Control-exercise	9.47 ± 1.83	0.764	< 0.001
	Control-music	8.90 ± 1.34	0.751	< 0.001
	Music-exercise	0.57 ± 0.16	0.727	0.148

Exercise had a more long-lasting effect and no side effects compared to counseling, but counseling was better in the first year than the control group. Additionally, the exercise program, general health, health-related factors, and patient health were all improved due to this treatment.

Music therapy reduces stress, anxiety, and depression in patients with cancer. Therefore, music can be considered a healthy means of self-expression. People can improve their mental and physical health through music therapy. Rhythm, order, and predictability are used in this method to help people make new memories and calm their bodies and minds. In addition to lowering heart rate and deepening breathing, music has beneficial effects on anxiety and depression. Music therapy positively affects the respiratory system; breathing has a rhythm, and slow and deep breathing calms and controls a person's emotions and is associated with a healthier metabolism, according to an alternative explanation. Thus, pleasant music can significantly affect the body through pleasure and respiratory changes. As a result of its simple rhythm and melody, the use of calming music does not induce any particular excitement or emotion and makes it easier for a calm listener to perform mental tasks and process information. The body's physiological activity is affected by gentle music because the heart rate decreases, breathing becomes deeper, sympathetic system activity decreases, and the individual becomes relaxed (Joo et al., 2022).

Moreover, some sessions discussed the causes of anxiety and depression. As a result, the individuals could better understand their thoughts and feelings. These techniques taught the individuals how to manage their emotions by giving them a sense of agency over their feelings. Words give people a more focused experience and help them see the world as a whole more clearly. Verbal expression of emotions is a multidimensional process that helps people learn how to control themselves and deal with anxiety. In addition, when the emotional revelation is used, the person's cognitive understanding of the emotional situation changes, bad and destructive feelings disappear, and the person realizes their emotional needs. As a result, the person uses more effective defense mechanisms, such as dealing with emotional memories, controlling attention, and applying cognitive processing. The person gains a better understanding of what happened and a new perspective. Thus, it gives people a way to deal with their anxiety and depression. In another explanation, it can be said that expressing emotions and feelings with a coach causes a review of emotional events and experiences and changes the way they are organized. Therefore, writing therapy helps with both physical and mental issues (Knoerl et al., 2022).

Exercise and music therapy are supportive, non-invasive treatment tools for relieving pain and anxiety, enhancing feelings of relaxation, boosting immunity, and lowering blood pressure, heart rate, and respiration. Both treatments release endorphins, which regulate emotions and alleviate pain, stress, anxiety, and depression. Music can also improve a person's comfort and well-being during illness and distress. The present study was limited by self-reporting research instruments

and the lack of post-treatment follow-up of treatment outcomes. In order to gain greater confidence and obtain more complete results, it is recommended that research be conducted in additional cities and samples, along with a longer follow-up period, and the results be compared. It is recommended that exercise therapy and music therapy be used in medical centers and hospitals to alleviate anxiety and depression in patients, given that the use of non-drug therapies is cost-effective and highly practical. Patients with mental health issues may benefit from further research into the effects of exercise program length, combination, and musical genres. Because patients in the study expressed concerns about various other issues, including sexual dysfunction and low mood, it would be prudent to look into these interventions' physiological and psychological effects.

Conclusion

The current study found that exercise-based therapy and music reduced anxiety and depression in patients with breast cancer. As a result, these therapeutic interventions can significantly improve the psychological symptoms of women with breast cancer and thus their lives. According to the findings of this study, music-based therapy and writing should be considered a non-invasive intervention that is simple, low-cost, effective, and efficient in reducing anxiety and depression in patients in treatment and care departments.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

None.

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