2025 Volume 10, Issue 1
Advances in Precision Medicine
ISSN: 2424-9106 (Online)
ISSN: 2424-8592 (Print)

The Effect of Exercise-Psychology-Sleep Intervention on the Psychological State and Sleep Quality in Breast Cancer Patients

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Abstract:

Objective: To explore the specific situation of different intervention programs in patients with breast cancer. *Methods:* 60 cases of breast cancer patients admitted to the hospital from January 2024 to September 2024 were divided into control groups and observation groups by random number table method, with 30 cases in each group. The control group received routine intervention, and the observation group received exercise-psychology-sleep intervention. The psychological state, sleep quality and quality of life of the two groups were compared. *Results:* After intervention, the scores of depression, anxiety, extroversion irritability and introversion irritability were significantly reduced in 2 groups, and the improvement was more prominent in the observation group. In PSQI scores, sleep quality, sleep time, sleep efficiency, hypnotic drugs, daytime dysfunction and sleep disorder scores in the observation group were significantly lower than those in the control group. The scores of social function, emotional function, cognitive function, role function, and physical function of the two groups were significantly improved, and the improvement of the observation group was more prominent. Compared with the above different indexes, the observation group was better than the control group, and the difference was statistically significant ($P < 0.05$). *Conclusion:* The application of exercise-psychology-sleep intervention in breast cancer patients is effective and valuable.

Keywords:

Exercise-psychology-sleep intervention
Breast cancer
Mental state
Sleep quality
Quality of life

Online publication: March 4, 2025

1. Introduction

Breast cancer is a clinical multiple malignant tumor, the lesion location is usually breast epithelium or duct epithelium. Clinical data show that the incidence of breast cancer accounts for 11.9% of the global cancer incidence and the case fatality rate is 6.4% [1]. The cause of the disease is not clear, and may be directly related to breast cancer genes, sex hormones and other factors, especially for women with a family history of breast cancer, the probability of disease is significantly higher. At the same time, adverse lifestyle and environmental factors may also have a certain impact on the incidence of breast cancer. The progression of breast cancer is mainly divided into four stages: early stage (stage I), middle stage (stage II), locally advanced stage (stage III), and advanced stage (stage IV) [2]. Among them, early breast cancer patients usually have a high cure rate, but as the disease progresses to the middle and late stages, the difficulty of treatment increases significantly, which causes the psychological state and sleep quality of patients to be generally poor, and thus poses a serious threat to the physical and mental health of patients. At present, the treatment of breast cancer focuses on surgery, chemotherapy, radiotherapy and other means, but due to the long treatment time, high cost, many side effects and other factors, aggravate the patients' anxiety, fear and other negative emotions, resulting in a greatly reduced prognosis of patients. Therefore, it is important to integrate scientifically feasible nursing interventions into the treatment of breast cancer patients. Routine nursing is a single intervention mode, it is difficult to take comprehensive and effective physical and mental care of patients, and may cause poor nursing effect and low patient satisfaction. As for the exercise-psychology-sleep intervention, it is a comprehensive nursing mode, which has played multiple positive roles by integrating it into modern clinical practice, truly realizing the simultaneous treatment of body and mind, and promoting the comprehensive recovery of patients. Based on this, in order to explore the clinical effects of different intervention schemes for breast cancer patients, a total of 60 patients eligible for the study were included for corresponding analysis, as detailed below.

2. Data and methods

2.1. General information

Sixty patients with breast cancer admitted to our hospital were retrospectively analyzed and divided into 2 groups by random number table method, namely the control group (routine intervention) and observation group (exercise-psychological-sleep intervention). The baseline data corresponding to age, disease course and body mass index of the two groups are shown in **Table 1** below.

Inclusion criteria: (1) Meet the diagnostic criteria of breast cancer in the Guidelines and Norms for Diagnosis and Treatment of Breast Cancer of the Chinese Anti-Cancer Association (2021 edition) [3]; (2) Willing to accept the intervention plan, sign the informed consent; (3) No other serious organic diseases, such as cardiovascular disease, diabetes, etc.; (4) No history of mental illness or serious mental disorder; (5) No obvious contraindications to exercise.

Exclusion conditions: (1) Advanced breast cancer with short expected survival; (2) Have received other psychological or exercise interventions for breast cancer; (3) Poor compliance, there are language communication barriers; (4) Have other malignant tumors or are receiving other anti-tumor therapy; (5) Be blind in both eyes or deaf in both ears.

Table 1. Comparison of baseline data between the two groups (n = 30), (mean ± standard deviation)

Group	Age (year)	Course of disease (year)	Body mass index (kg/m^2)	Tumor body diameter (cm)
Observation group	50.15 ± 1.22	2.28 ± 0.36	22.66 ± 1.05	4.10 ± 1.15
Control group	50.00 ± 1.16	2.30 ± 0.29	22.52 ± 1.02	4.21 ± 1.09
t value	0.488	0.237	0.524	0.380
P value	0.627	0.814	0.602	0.705

2.2. Methods

The control group was subjected to routine intervention, specifically as follows: Professionals explained the disease knowledge of breast cancer to patients, including the pathogenesis, treatment process, possible side effects and coping strategies, so as to strengthen patients' disease cognition. Guide patients to use the drug correctly, explain in detail the time, dosage and possible side effects of each drug, and mobilize patients' compliance with treatment. The importance of maintaining regular work and rest is emphasized, and patients are advised to follow scientific work and rest time to avoid overwork affecting the treatment effect. The observation group was given exercise-psychological-sleep intervention, specifically as follows.

2.2.1. Exercise nursing

(1) Hand training

On the premise of maintaining the stability of the shoulder joint, the patient first performs mindfulness meditation for 5 minutes, closes the eyes, takes a deep breath, focuses on the breath, feels the feeling of air entering and leaving the nasal cavity, and gradually relaxes the muscles of the whole body. Then, the affected hand was used to grip the colored clay ball, and the movements of clenching and releasing were performed successively. At the same time, the state of mindfulness was continued, focusing on the movements and feelings of the hand, such as the texture of the colored clay ball in the hand, the changes in the strength of the finger joints during flexion and extension, and the feeling of muscle stretching when the wrist was bent and extended. Each training consists of 20 clench-release cycles, as well as the same number of finger extension and wrist flexion exercises, 3 sets a day, each set of 1-minute interval rest. During the break, the patient again performed a short mindfulness meditation to refocus and prepare for the next round of training.

(2) Forearm training

The patient remained in a seated or semi-recumbent position and first performed mindful breathing exercises for 3 minutes, focusing on the rise and fall of the abdomen and feeling the physical relaxation brought about by each breath. Then, pass the colored clay ball alternately through the left and right hands, each passing distance of 30 cm, to enhance the muscle strength of the forearm and hand-eye coordination. During the transmission process, the patient continues to be mindful, focusing on the movements and feelings of the arm, such as the power of the muscles, the movement of the joints, and the transmission sensation of the colored clay ball in the hand. Then, holding a color brush in hand, the forearm was extended on the drawing paper to draw and fill in the outline and color of the pattern, each training lasted 10 min, twice a day.

(3) Elbow training

Start with a 2-minute mindful body scan, starting with the head and gradually moving your attention downward to feel the tension and relaxation in various parts of the body, especially the feeling of the elbows and arms. Then, the affected hand holds the colored clay ball, and with the assistance of the healthy arm, the colored clay ball is slowly lifted to the opposite shoulder for 30 seconds to exercise the stability of the elbow joint. Continue to be mindful, focusing on the stability of your elbow and the sensation of power in your muscles. Next, gently touch the colored clay ball to the same side ear lobe, stretch the elbow muscles and ligaments, and feel the stretching sensation. Five times each time, two sets a day, with a 2-minute rest between each set.

(4) Shoulder training

Start with 4 min of mindful walking exercises, focusing on the lifting, moving and lowering of your feet, and feeling the balance of your body and the shift of your weight. Hold the pen in the affected hand to raise the shoulder joint, straighten and bend the arm to 90°. Continue to be mindful and focus on shoulder movements and feelings, such as the range of motion of the shoulder joint, the contraction and relaxation of the muscles, and the balance and coordination of the body. Each training consisted of 20 extension-flexion cycles, 3 sets per day, with each set spaced 1 minute apart. During the interval, patients perform short mindfulness standing exercises to feel their body's contact with the ground, adjust their breathing, relax and prepare for the next round of training.

2.2.2. Psychological nursing

(1) Emotional release

Emotional release activities were held once a week,

each time lasting 90 min. Through guided meditation, emotional diary sharing and other links, help patients to identify and express their inner fear, anxiety and other negative emotions. Subsequently, cognitive behavioral therapy is used to guide patients to re-evaluate and adjust their cognition of the disease, and establish a positive attitude towards the disease.

(2) Personalized psychological counseling services

The duration of each consultation is 50 minutes. For the questions or concerns of patients, the nursing staff will patiently answer them to relieve the bad emotions of patients. Share successful recovery cases, encourage patients to keep a recovery journal, and teach relaxation techniques such as deep breathing and progressive muscle relaxation to relieve tension and improve mental resilience.

(3) Family support and education

Organize a family support and education activity once a week, each activity lasts 2 hours. Psychological counselors, breast doctors and rehabilitation patients are invited to share the experience of psychological adjustment in the course of disease treatment and promote communication and understanding between patients and their families. Through group discussion, role play and other forms, enhance the sensitivity and support ability of family members to the psychological needs of patients. In the activity, a "voice exchange" link was set up, and each group of families had 15 minutes to play roles so that patients and family members could exchange roles, simulate each other's daily experiences and feelings, and enhance mutual understanding and empathy.

2.2.3. Sleep care

The root causes of poor sleep quality of patients were analyzed, and targeted sleep intervention programs were formulated according to patients' personal preferences.

(1) Music therapy

30 minutes before going to bed every night, play soothing music for 15 minutes, such as classical music or natural sounds (such as rain, and waves), and control the volume at about 40 decibels to reduce the difficulty of falling asleep.

(2) Acupressure therapy

At 1 hour before going to bed every night, guide patients to soak their feet, control the water temperature at 40–45 ℃, and add an appropriate amount of mugwort or lavender essential oil (about 10 drops) to the water to promote blood circulation and relieve fatigue. After foot soaking, the patient was subjected to acupressure on the head, neck and feet, each massage lasting 15 minutes to improve sleep quality.

(3) Diet therapy

Explain to the patient the benefits of drinking hot milk before going to bed, and advise the patient to avoid eating too much greasy and spicy food at dinner.

(4) Drug therapy

For people with poor sleep quality, it is necessary to take an appropriate amount of sleeping drugs, such as zolpidem, esazolam, etc., but it should be used under the guidance of a doctor to avoid drug dependence. The intervention time of 2 groups was 1 month.

2.3. Observation indicators

(1) Psychological state: The Irritability, Depression and Anxiety Scale (IDA) was used to evaluate the four dimensions, including depression, anxiety, extroversion irritability and introversion irritability. The total score was 15 points, 15 points, 12 points and 12 points, and the score was negatively correlated with the psychological state.

(2) Sleep quality score: 7 dimensions of sleep quality, sleep time, sleep time, sleep efficiency, hypnotic drugs, daytime dysfunction and sleep disorders, assessed by the Pittsburgh Sleep Index Scale (PSQI), the total score of each dimension was 3 points, and the total score of sleep quality was 21 points, and the score was negatively correlated with the sleep quality of patients.

(3) Quality of life: Social function, emotional function, cognitive function, role function, physical function 5 dimensions, the evaluation of the quality of life scale (EORTCQLQ-C30), the total score of each dimension is 100 points, the score is positively correlated with the quality of life of patients.

2.4. Statistical processing

SPSS 23.0 statistical software was used to analyze the study data. Measurement data conforming to normal distribution were expressed as (mean ± standard deviation), and a comparison of differences between groups was conducted by *t*-test. The count data were expressed as frequency and percentage (%), and the difference between groups was compared by χ^2 test, and $P < 0.05$ was statistically significant.

3. Results

3.1. Compare the psychological state of the two groups before and after the intervention

After the intervention, the psychological status of the observation group was significantly lower than that of the control group in all dimensions, and the comparison was statistically significant, as shown in **Table 2** below.

3.2. Compare PSQI scores of group 2 patients

After the intervention, the score of sleep quality in the observation group was significantly lower than that of the control group, and the comparative statistical significance was true, as shown in **Table 3** below.

3.3. Compare the quality of life score before and after the intervention

After the intervention, the score of QoL in the observation group was significantly higher than that of the control group, and the comparative statistical significance was true, as shown in **Table 4** below.

Table 2. Comparison of the psychological state of the two groups of patients before and after intervention ($n = 30$), (mean ± standard deviation)

Project	Time	Observation group	Control group	*t* value	*P* value
Depressed	Before the intervention	8.20 ± 0.22	8.18 ± 0.17	0.394	0.695
	After the intervention	4.50 ± 0.11	5.06 ± 0.15	16.490	0.000
Anxious	Before the intervention	9.02 ± 0.31	9.11 ± 0.22	1.297	0.200
	After the intervention	4.50 ± 0.21	5.26 ± 0.18	15.050	0.000
Extravagance provoked	Before the intervention	6.70 ± 0.32	6.68 ± 0.29	0.254	0.801
	After the intervention	4.31 ± 0.17	5.25 ± 0.23	18.002	0.000
Introverted provoke	Before the intervention	6.88 ± 0.36	6.97 ± 0.29	1.066	0.291
	After the intervention	4.12 ± 0.20	5.25 ± 0.30	17.166	0.000

Table 3. Comparison of the PSQI scores ($n = 30$), (mean ± standard deviation)

Project	Observation group	Control group	*t* value	*P* value
Sleep quality	1.22 ± 0.21	2.05 ± 0.52	8.106	0.000
Sleep time	0.98 ± 0.15	1.57 ± 0.26	10.766	0.000
hour of sleep	0.80 ± 0.30	1.52 ± 0.51	6.665	0.000
Sleep efficiency	0.92 ± 0.26	1.85 ± 0.37	11.264	0.000
Hypnotic drugs	0.82 ± 0.32	1.88 ± 0.40	11.334	0.000
Day dysfunction	0.85 ± 0.21	1.69 ± 0.30	12.564	0.000
Dyssomnia	1.05 ± 0.50	1.90 ± 0.39	7.342	0.000

Table 4. Comparison of the quality of life score (n = 30), (mean ± standard deviation)

Project	Time	Observation group	Control group	*t* value	*P* value
Social function	Before the intervention	38.05 ± 2.21	38.20 ± 2.19	0.264	0.793
	After the intervention	55.60 ± 2.80	45.72 ± 2.51	14.391	0.000
Emotional function	Before the intervention	59.12 ± 2.02	59.10 ± 2.00	0.039	0.969
	After the intervention	75.77 ± 2.52	65.76 ± 2.26	16.197	0.000
Cognitive function	Before the intervention	60.70 ± 1.85	60.75 ± 1.82	0.106	0.916
	After the intervention	75.80 ± 1.99	70.12 ± 1.86	11.421	0.000
Role function	Before the intervention	46.60 ± 1.80	46.55 ± 1.82	0.107	0.915
	After the intervention	60.50 ± 2.08	52.59 ± 1.96	15.159	0.000
Somatic function	Before the intervention	55.02 ± 2.09	55.10 ± 2.05	0.150	0.882
	After the intervention	72.68 ± 2.66	65.71 ± 2.70	10.072	0.000

4. Discussion

In recent years, with the acceleration of the pace of life, more and more people suffering from breast cancer disease, coupled with staying up late, unbalanced diet and other factors, the incidence of the disease group is becoming younger and younger. Once sick, in addition to physical pain, such as breast pain, swelling, skin changes, etc., patients will also face multiple psychological troubles, such as fear, anxiety, depression and other emotional problems. In the long run, patients' sleep and quality of life will be deeply affected [4]. Taking the decline in sleep quality as an example, the main manifestations are prolonged sleep time, easy to wake up at night, and reduced total sleep time, which virtually aggravates the clinical symptoms of patients, resulting in unsatisfactory treatment effects patients and a blocked rehabilitation process.

Previous studies have pointed out that the effect of simple routine nursing in the clinical treatment of breast cancer patients is not significant, and it is easy to ignore the individual needs and psychological state of patients, resulting in insufficient comprehensive and in-depth nursing, which only increases the helplessness of patients in the face of the disease [5]. Exercise-psychology-sleep nursing has been a common intervention in clinical practice in recent years. It emphasizes individualized intervention for patients from three levels: movement, psychology and sleep. Taking sports nursing as an example, it emphasizes making exercise plans according to patients' physical conditions, such as hand training, forearm training, etc., to enhance patients' physical fitness and alleviate the side effects of treatment. Taking psychological care as an example emphasizes listening to the psychological demands of patients, providing psychological counseling and support, and then helping patients to establish a positive attitude. Especially in the aspect of sleep care, the application of music, acupressure, diet, and other therapies has improved the sleep quality of patients from many aspects. For example, by playing soft music to reduce anxiety. Through acupressure, relieve patients' physical tension, promote blood circulation, etc., reflects the full respect for patients' individual differences, and undoubtedly provides strong support for patients' road to recovery.

With breast cancer patients as the main body, Wang *et al.* (2023) [6] focused on the psychological state of patients before and after intervention and the results showed that: The observation group of exercise-psychology-sleep nursing had a more prominent improvement in mental state ($P < 0.05$). In this study, the mental state indicators of patients were also analyzed to verify the researcher's research results, indicating that the clinical application of exercise-psychology-sleep nursing in breast cancer patients is feasible. It has a great relationship with the more comprehensive intervention mode covered by exercise-psychology-sleep care, which meets the disease needs of patients, and promotes the improvement of patients' anxiety,

depression and other adverse emotions. Sleep quality is an important index to evaluate patients' sleep condition. Through the implementation of different intervention methods, the sleep conditions of patients in the observation group were improved more significantly ($P < 0.05$), which was consistent with the research of scholar He (2022) [7], highlighting the self-evident application value of exercise-psycho-sleep care. The reason for the analysis is that this intervention can directly affect patients' daily sleep conditions by improving their daily rest habits. Adjusting the mental state and increasing the appropriate amount of physical activity has directly improved the quality of sleep for patients. This study also found that by implementing different interventions, the quality of life score of the observation group was significantly higher than that of the control group ($P < 0.05$), which had something in common with the research of Yang *et al.* (2020) [8]. It can be seen that in the nursing of breast cancer patients, the combined intervention mode not only optimized the psychological state and sleep quality but also significantly improved the overall quality of life of patients. It provides strong support for the comprehensive recovery of breast cancer patients. In conclusion, the application of exercise-psycho-sleep intervention to breast cancer patients can help improve their psychological state, sleep quality and quality of life, and is worth promoting.

Disclosure statement

The authors declare no conflict of interest.

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