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# The effect of the Benson relaxation technique on sleep quality in women with breast cancer after mastectomy

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## Abstract

**Background:** Sleep disorder is common in women with mastectomy. Previous studies have shown that relaxation technique improves sleep quality. However, the effects of these interventions on the sleep quality of breast cancer patients who underwent mastectomy surgery is still unclear. This study aimed to determine the effect of the Benson relaxation technique (BRT) on sleep quality in women with breast cancer after mastectomy.

**Methods:** This randomized clinical trial study was performed on 72 eligible patients who were referred to the screening and chemotherapy center of Shahid Modares Hospital of Kashmar City from April to July 2021. The patients were selected through convenient sampling and randomly allocated to intervention (n = 36) and control (n = 36) groups. In the intervention group, in addition to the routine treatments, BRT was performed once in the morning and once in the evening for 2 months, each time for 20 minutes. The Pittsburgh Sleep Quality Index (PSQI) was used to evaluate the score of sleep quality at the beginning of the study and 2 months later. Data were analyzed using the paired t test and independent t test at 95% CI.

**Results:** The mean score of sleep quality before the intervention in the intervention and control groups was 9.25 ± 2.50 and 8.47 ± 2.13, respectively. After the intervention, the mean score of sleep quality in the intervention and control groups was 6.63 ± 1.92 and 8.41 ± 2.15, respectively, and the difference was significant between the 2 groups (P = 0.001)

**Conclusion**: The Benson relaxation technique improves sleep quality in women with breast cancer after mastectomy. Therefore, it can be considered an adjunct therapy to improve the sleep quality in these people.

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## Highlights

**What is current knowledge?**

Sleep disorder is common in women with breast cancer. Recent studies have shown an association between relaxation techniques and improved sleep quality. However, the effect of the Benson relaxation technique on sleep quality in women with breast cancer after mastectomy has not been studied.

**What is new here?**

The Benson relaxation technique improves sleep quality in women with breast cancer after mastectomy.

## Introduction

Sleep disorders can affect quality of life and increase the risk of developing a variety of systemic disorders and metabolic syndromes, as well as the risk of mortality in individuals (1). There is also a direct relationship between sleep disorders and types of mental disorders, such as anxiety, depression, and immune system disorders (2, 3). Mastectomy may cause physiological, psychosocial, and social problems for the patient, including sleep disorders (4). According to a report, 30% to 60% of breast cancer patients who have undergone mastectomy suffer from sleep disorders (5).

Benzodiazepines are widely used to treat sleep disorders (6, 7). However, these drugs cause side effects, such as tolerance and dependence (8). Another way to improve sleep quality is physical activity, but it may not be tolerable for patients due to the fact that these patients suffer from chronic fatigue (9).

In nursing, many methods of complementary therapy are used in the treatment of cancer-related complications, such as pain, fatigue, and anxiety. These complementary therapies include hypnosis, music therapy, relaxation, etc. (10). The Benson relaxation technique (BRT) is classified as one of the relaxation methods that have been widely used in the treatment of pain, anxiety, and stress, which can cause sleep disorders. This technique has been used in nursing care in the sleep disorders of different patients, but it has not been accomplished in the sleep disorders of breast cancer patients undergoing mastectomy. The Benson relaxation technique is a method that does not require special skills and can be easily learned by patients through oral training or by providing pamphlets and educational films. The patient can do it alone, and her independence is maintained. It does not require time and energy. No side effect has been mentioned, and it does not interfere with other treatments of the patient; it is considered a nursing action (11). When a person is relaxed, it reduces the pressure on the muscles by affecting vital signs and reducing muscle tension. This makes the person less affected by environmental stimuli and is effective in improving sleep quality (12).

Studies have shown that BRT improves sleep quality in the elderly (13), reduces stress, depression, and anxiety in patients with multiple sclerosis (14), and reduces stress in emergency care (15). Moradipour et al also showed that BRT might promote hope among patients with breast cancer (16).

Despite the benefits of BRT mentioned above, its effect on the sleep quality of cancer patients, especially patients who have undergone mastectomy, is still unknown. Therefore, this study aimed to determine the effect of BRT on sleep quality in women with breast cancer after mastectomy. If the technique is effective, it can be used as a supportive method to enhance sleep quality and improve the quality of life of these patients.

## Methods

This clinical trial study was accomplished in Shahid Modarres Hospital in Kashmar City, Iran, between April and July 2021. The study population included all women with breast cancer who underwent unilateral modified radical mastectomy (MRM) or extensive radical mastectomy (ERM) and were referred to the screening and chemotherapy center of Shahid Modares Hospital. The sample size was calculated as 36 for each group using the following formula and based on the study of Rakhshani et al. (1), considering α = 0.05 and power = 80%, and 10% attrition rate.

$$n1 = n2 = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\frac{\beta}{2}}\right)^2 ((S_1)^2 + (S_2)^2}{(\mu_1 - \mu_2)^2} = \frac{8*(18.44+15.04)}{2.83^2} = 33$$

Inclusion criteria were patients who have undergone complete unilateral

mastectomy, aged between 30 and 55 years, willingness to participate in the study, full consciousness, no metastasis, had completed all stages of chemotherapy and radiation therapy both before and after the surgery for a duration of 2 weeks, no specific physical complications related to the surgery and chemotherapy, no severe mental disorders, and no addiction. The exclusion criterion was physical complications related to the surgery.

A total of 98 patients had undergone mastectomy in Omid Hospital, affiliated with Mashhad University of Medical Sciences. Of the 98 patients, 81 had sleep disorders, 72 of whom met the inclusion criteria and were included in the study (Figure 1). After completing the Pittsburgh Sleep Quality Index (PSQI) and confirming sleep quality disorders, the research units were selected through convenient sampling and randomly allocated to the intervention (n = 36) and control (n = 36) groups according to permutation blocks designed using R version 3.3.1. Initially, BRT training was conducted in the intervention group by a certified person, who was a psychologist and not aware of the study purpose. The psychologist first provided instruction on the steps of the BRT to each patient individually. This training took place in a quiet room in the surgery clinic. Then, the patient was asked to perform BRT at least once in the presence of the researcher. An audio file was provided to the research units in the intervention group that explained the stages of BRT for further learning. Then, the patient was asked to perform BRT twice a day (preferably in the morning and in the afternoon) and each time for 15 minutes for a period of 2 months at home. Due to the fact that some patients might forget the technique, a self-report questionnaire (checklist) was prepared daily and given to each patient to record their performance on a daily basis. Also, weekly phone calls were made with the patients to ensure that BRT was performed regularly. In addition, a contact number was provided to the research units to contact the researcher in case of any problem or question. If the patients did not perform BRT for 2 days or more a week, they were excluded from the study. The control group did not receive BRT. Since the patients performed the intervention at home, the possibility of diffusion of information between the 2 groups was minimal. After the end of the second month of intervention, the PSQI questionnaire was completed by the researcher for both the intervention and control groups. Data collection was done by the research assistant, who was not aware of the group allocation. The statistician was also unaware of the group allocation during data analysis.

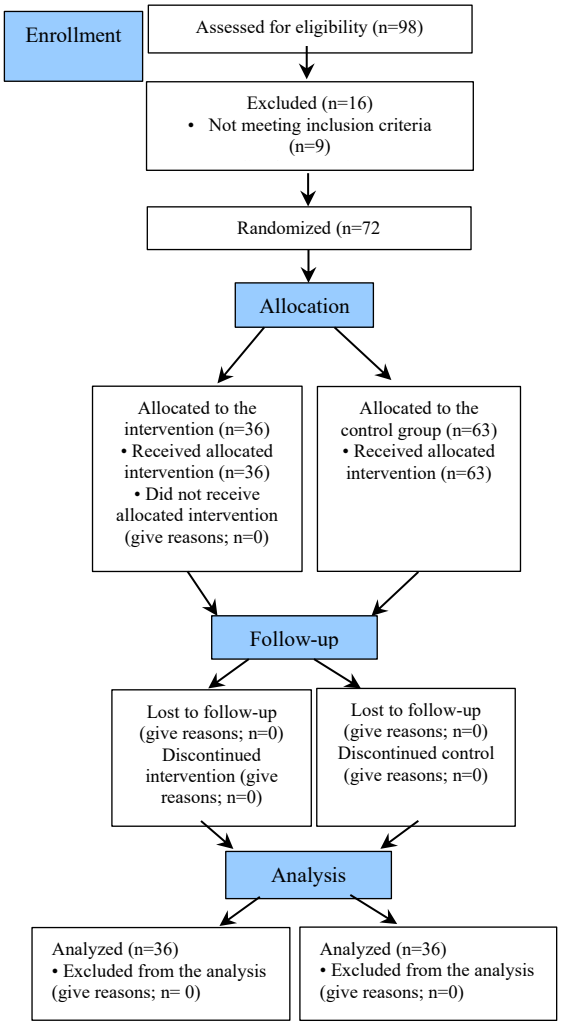


**Figure 1.** The flowchart of the design, group, and participants

Data were collected using the questionnaire, including demographic characteristics, clinical information, and PSQI. Demographic characteristics included age, marital status, family, children, social support system, income, and sports. The clinical information included the duration of breast cancer, history of surgery, medicinal history, history of other diseases, and use of hypnotics.

PSQI is a self-report tool that assesses sleep quality over the past month and includes 19 questions in 7 components (ie, subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction). Each component receives a score between 0 and 3 and the total score attained from this index ranged from 0 to 21. A score less than 5 indicates the desired sleep quality, and scores equal to or greater than 5 indicate that the person sleeps less or has many problems in at least 2 or more of these components. The validity of PSQI has been proven in various studies. The validity and reliability of this questionnaire were assessed by the Cronbach α method, which is 86% and 89%, respectively (18).

Data were analyzed using SPSS version 16 (SPSS Inc, Chicago, IL, USA) using the chi-square test, analysis of variance (ANOVA), paired t test, and independent t test. The significance level of the tests was considered to be 5%.

## Results

A total of 72 women with a mean age of 47.11 ± 4.82 years were evaluated in this study. Most of the participants had secondary education (39%) and were housewives (36%) and married (56%). The 2 groups were not significantly different in terms of demographic characteristics, such as age, education, marital status, income, place of residence, family members whom the person lives with them, children, drug use, narcotic use, exercise, co-infection, family history of mastectomy and smoking ($P > 0.05$; Table 1). There was a significant difference in job and social-supportive systems between the 2 groups ($P < 0.05$).

**Table 1**. Comparison of demographic variables between the 2 groups

| Demographic characteristics | | Intervention N (%) | Control N (%) | P value |
|---|---|---|---|---|
| **Education** | Elementary | 14(38.90) | 7(19.44) | 0.24 |
| | Guidance school | 11(30.55) | 17(47.25) | |
| | High school | 9(25.00) | 11(30.55) | |
| | University | 2(5.55) | 1(2.80) | |
| | Retired | 1(2.0) | 0(0.00) | |
| **Marital status** | Single | 5(13.9) | 4(11.11) | 0.57 |
| | Married | 23(63.8) | 21(58.30) | |
| | Divorced | 1(2.8) | 4(11.11) | |
| | Death of husband | 7(19.50) | 7(19.50) | |
| **Exercise** | Do exercise | 10(27.70) | 14(38.80) | 0.31 |
| | Do not exercise | 26(72.20) | 22(61.10) | |
| **Simultaneous infection with another disease** | Have co-infection | 16(45.00) | 23(63.80) | 0.09 |
| | Do not have co-infection | 20(55.00) | 13(36.10) | |
| **Family history of mastectomy** | Have family history | 9(25.00) | 13(36.10) | 0.30 |
| | Do not have family history | 27(75.00) | 23(63.80) | |

The mean score of sleep quality before the intervention was 9.25 ± 2.5 in the intervention group and 8.47 ± 2.13 in the control group. The result of the independent t test showed that the difference was not statistically significant, and the 2 groups were matched in terms of the mean score of sleep quality ($P > 0.05$). However, after the intervention, the mean score of sleep quality was 6.63 ± 1.92 in the intervention group and 8.41 ± 2.15 in the control group. The mean score of sleep quality decreased in the intervention group, and this difference was statistically significant ($P < 0.001$; Table 2). The results of the analysis of covariance (ANCOVA) for sleep quality after the intervention by adjusting the effect of job, social-supportive system, and sleep quality before the intervention

**Table 2**. Comparison of the mean score of sleep quality in the intervention and control groups

| Sleep quality | | Mean ± SD | | Independent *t* test result |
|---|---|---|---|---|
| | | Intervention group | Control group | |
| Total sleep quality before the intervention | | 9.25±2.50 | 8.47±2.13 | P=0.58 |
| Total sleep quality after the intervention | | 6.63±1.92 | 8.41±2.15 | P=0.001 |
| Paired *t* test result | Befor and 2 months after the intervention | P=0.001 | P=0.57 | |

showed that the mean of sleep quality was statistically significant between the 2 groups (P < 0.001; Table 3).

The results showed that by adjusting the effect of influential variables (such as age), the total score of sleep quality in the intervention group significantly decreased to 2.6 at the end of the intervention.

**Table 3**. The results of analysis of covariance with the control confounding Effect of the group before the intervention, job, and social-supportive system

| Dependent variable | Source | Mean square | F | Sig. |
|---|---|---|---|---|
| Sleep quality 2 months after the intervention | Intercept | 1937.30 | 349.77 | P< 0.001 |
| | Sleep quality before the intervention | 126.01 | 52.05 | P=0.12 |
| | Group | 86.77 | 35.84 | P< 0.001 |
| | Job | 1.72 | 0.31 | P= 0.91 |
| | Social-supportive system | 0.81 | 0.14 | P= 0.70 |

## Discussion

The results of this study showed that the intervention improved the total score of sleep quality in most components (ie, subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, and daytime dysfunction) in the intervention group. Also, the intervention improved sleep quality for 3 scores. These findings are consistent with other studies conducted on sleep quality using BRT. Rakhshani et al showed that BRT affected sleep quality in chronic heart patients (20). Akıncı et al also showed that body posture and muscle relaxation can reduce pain and improve sleep quality in patients undergoing heart surgery, which is consistent with the present study (19). Since BRT reduces anxiety, depression (15), cancer-related fatigue (22), death anxiety (16) caused by disturbance in body image, and pain following surgery, it can play a role in improving the sleep quality of mastectomy patients. Debellemaniere et al showed that progressive muscle relaxation was effective in reducing anxiety and improving patients' sleep quality during the day, which is consistent with the present study (23). According to a study, BRT can improve sleep quality by affecting vital signs and muscle relaxation and reducing the patient's attention to environmental stimuli (20). In the present study, the total score of sleep quality improved after relaxation techniques in the intervention group. Although BRT improved the sleep quality of these patients, it was not able to return it to a normal level, which may be due to severe sleep disorders in women with cancer, as well as anxiety and depression in these patients; thus, supportive measurements should be taken in these patients before the severity of these disorders (24). These results can indicate that BRT improves a person's psychological symptoms, thus enhancing sleep quality and improving the patients' quality of life. In addition, BRT (as a self-regulation method in stress management) and ignoring deviant thoughts can reduce sleep-disturbing stimuli and improve the quality of sleep (25).

The present study showed that demographic variables (such as job and social-supportive system) have no effect on sleep quality; this is consistent with the study by Jalali et al, who showed no significant relationship between demographic variables, such as job and sleep quality (26). However, Norouzi et al showed that women with a low social-supportive system had a lower quality of sleep, which is not consistent with the results of the present study (27). This may be due to the fact that in our study, most of the participants in the intervention group were in the desired supportive system, and there was a significant difference between the intervention and control groups from the beginning in terms of social support.

Also, the participants had a low mean age, which removed some barriers (including cognitive barriers), facilitated learning, and increased the accuracy and focus of participants to implement the intervention. The other strength was the acceptable cultural level of individuals to cooperate and participate in the research. This means that many participants had the experience of participating in the research and had a high level of motivation to cooperate in the study due to the positive and satisfactory results that they had obtained from previous studies.

One of the limitations of this study was the COVID-19 pandemic. Since cancer patients were considered a high-risk group, this pandemic increased stress and anxiety in patients and acted as an intervening factor. On the other hand, one of the effects of the COVID-19 pandemic was a decrease in patient referrals to medical units, and the access to the participants was more difficult than the normal situation. To counteract this limitation, further studies are needed to be performed in non-pandemic situations. The other limitation of the study was the attitude of participants toward BRT, which led to the lack of cooperation and non-acceptance among some participants. To address this limitation, we explained to the participants that BRT, while not requiring time, energy, and expense, may be effective in resolving sleep disorders.

## Conclusion

The Benson relaxation technique has a positive effect on sleep quality in patients with breast cancer undergoing mastectomy and improved sleep quality; thus, it can be taught by nurses as a useful method to improve the sleep quality of patients in oncology and chemotherapy wards.

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## Ethical statement

This study was approved by the Ethics Committee of Sabzevar University of Medical Sciences (code: IR.MEDSAB.REC.1399.061). Also, the study was registered on the Iranian Registry of Clinical Trials website (IRCT20210108049964N1). The study method was completely explained to the participants. In addition, the participants were informed that their participation in the study was optional, and they could leave the study at any time and without any restrictions. They were assured that their data would remain confidential, and the results of the research would be reported to them. Finally, written informed consent was obtained from all participants. The study entered the implementation phase after obtaining permission from the Vice Chancellor for Research of Sabzevar University of Medical Sciences and the Vice Chancellor for Research of Kashmar Hospital.

## Conflicts of interest

The authors declare that there is no conflict of interest.

## Author contributions

M.R. and R.C. designed the study. R.C. gathered data. M.R., R.C., A.G., and N.M. contributed to data analysis, interpretation, and the writing of the manuscript. M.R. supervised the study. All authors read and approved the final manuscript.

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