Original Article

The Effect of Music on The Sleep Quality of Breast Cancer Patients

Diğdem Lafçi, PhD
Research Assistant Gaziantep University Health Sciences Faculty of Gaziantep, Turkey

Gürsel Öztunç, PhD
Professor Dr. Cukurova University Health College of Adana, Turkey

Correspondence: Diğdem LAFÇI, Gaziantep University, Health School, Gaziantep, TR-27310, Turkey
E-mail: didemlafci@hotmail.com

Abstract

Introduction: Sleep disorders may result in fatigue, tiredness, depression and problems in daytime functioning. Music can reduce sympathetic nervous system activity, decrease anxiety, blood pressure, heart and respiratory rate and may have positive effects on sleep via muscle relaxation and distraction from thoughts. This paper is aims to investigate the effects of music on sleep quality in treatment provided for patients with breast-cancer with poor sleep.
Method: Control groups have not been used in most previous studies. We used a two-group repeated measures design. Sixty 60 patients with breast cancer (aged between 27 and 69 years) with sleep complaints were studied in 2008. Participants listened for between 21.00 and 01.00 at night to soft instrumental music (experimental group) at bedtime for 1 week. The control group received no intervention. The data were collected by using a questionnaire determining the sociodemographic features, Pittsburgh Sleep Quality Index (PSQI) were used in order to collect the data and Visual Analog Scales-VAS were utilized to measure level of satisfaction after the procedure.
Results: It was found out that music-therapy provided to the music group before sleep affected positively their quality of sleep whereas the quality of sleep of control group worsened more during hospitalization period. Also, the research results demonstrated that although there was a negative correlation between patient satisfaction and their quality of sleep in the music group it was not statistically significant ($p>0.05$).
Conclusion: Relaxing classical music is an effective intervention in reducing sleeping problems. Nurses could use this safe, cheap and easy to learn method to treat insomnia.

Key words: patient, nurse, cancer, music, sleeping quality.

Introduction

Sleep quality is a very important factor in quality of life. Sleep disorders can result in tiredness, fatigue, depression, greater anxiety, irritability, pain sensitivity, muscle tremors, immunosuppression, and lack of daytime alertness. Several studies have focused on the effects of music on sleep quality, and researchers have found, in a variety of study settings and populations, that music positively affects sleep (Pandi-Perumal, 2002; Harmat et al, 2008).

Insomnia is a common and significant problem in people with cancer. Prevalence estimates of this problem show 30–73% of all cancer patients report sleep difficulties, including people recently diagnosed with cancer and those having completed treatment (Anderson et al, 2003; Ancoli-Israel et al, 2006). Breast cancer survivors appear particularly susceptible to disturbances in sleep. Recent studies have revealed that an overwhelming majority of breast cancer survivors experience significant sleep difficulties at

diagnosis, during treatment and following treatment (Davidson, 2002; Carpenter et al, 2006). Another study (Savard et al. 2001) found 51% of women treated for breast cancer reported symptoms of insomnia with 19% meeting diagnostic criteria for clinical insomnia. Reasons for this high insomnia rate in breast cancer survivors may be explained by the fact that women in the general population are twice as likely to have insomnia, and hot flashes because hormonal ablation cancer treatment are one known cause of insomnia (Savard et al, 2001; O'Donnell, 2004). The importance of insomnia interventional research for breast cancer survivors is supported by the growing population of women who are surviving breast cancer world-wide. Currently over 1 million women worldwide are diagnosed annually with breast cancer, with a 75% survival rate in most developed countries (World Health Organization, 2007).

Insomnia in breast cancer patients is frequently accompanied by symptoms of fatigue, anxiety, depression and a lowered quality of life (Fortner et al, 2002; Carpenter et al, 2004). These commonly-reported symptoms are not often measured in clinical trial outcomes which offer treatment for insomnia. It is imperative that we now broaden the narrowed outcomes of success in treating insomnia to include additional indicators such as positive changes in fatigue, mood and quality of life (Morin, 2003; Morin et al, 2004).

Pharmacological therapy has been wildly used to treat sleep disorders, but the potential side effects limit a long term intervention. Realizing that sleep is affected by both physiological and psychological factors, people resorted to kinds of mind-body interventions such as music therapy, which indeed have been used from a very ancient time (Cervellin and Lippi, 2011). Based on a psychophysiological theory synthesized from the literature, sedative music induces a relaxation and distraction response, which reduces activity in the neuroendocrine and sympathetic nervous systems, resulting in decreased pain, stress, anxiety and sleep (Johnson 2003; Twiss et al, 2006; Allen , 2007; Arslan et al, 2008; Mc Caffrey, 2008;).

In fact, music is the most welcomed method used by nurses to improve the patients' sleep quality (Bouhairie et al, 2006). Some earlier studies succeeded to prove the efficacy of music in improving sleep quality (Zimmermann et al, 1996; Renzi et al, 2000; Kullich et al, 2003; Lai and Good, 2005). A number of studies conducted in clinical settings have suggested that sedative music may have positive effects on sleep via muscle relaxation and distraction from thoughts (Zimmermann et al, 1996; Johnson 2003; Chan et al, 2010). Music can reduce sympathetic nervous system activity, decrease anxiety, blood pressure and heart and respiratory rates (Salamon et al, 2003; Eugenia, 2005; Abhijeet et al, 2009). Zimmermann et al. (1996) studied the effects of relaxing music on sleep and pain in 96 patients who had undergone coronary artery bypass graft surgery (Zimmermann et al, 1996).

The research has investigated the effects of music on sleep in elementary school children (Tan, 2004). In the study of Hui-Ling et al. (2005) studied the effects of soft music on sleep quality in 60 older community-dwelling men and women in Taiwan (Hui-Ling and Marion, 2005). Harmat et al. (2008) studied the effects of relaxing classical music on sleep quality in 94 students with poor sleep (Harmat et al, 2008).

All studies showed that music had a statistically significant sleep-promoting effect thus, a sedative music intervention was expected to improve sleep quality. These results indicated that music is a potential non-pharmacological intervention for the treatment of sleep disturbances such as insomnia.

Methods

Aim

The aim of the study was to investigate the effects of music on sleep quality in breast cancer patients with poor sleep.

Design

A randomized experimental design was used, with two groups (music and control) and two measurement times (pre- and post-treatment). Participants were randomly assigned to treatment groups by the research assistant through the use of a random numbers table. The research assistant was not blinded to the group assignment.

Participants

Sixty patients (mean age =46.42±12.86, range:27-69 years), with sleep complaints were recruited at a university in Gaziantep. Participants were randomized using a computerized randomization table and variable block randomization. Each block was randomly assigned to the groups and the two groups in each block received only one 'treatment': listening to music (music group n = 30), or no intervention (control group n = 30).

The inclusion criteria were:

- volunteered to participate in the research,
- hospitalization for a week
- able to communicate,
- not having any auditory or speech problem,
- not taking any analgesic and anesthetic medicine before or during the procedure,
- not taking any sleeping pills before or during the procedure of music-therapy,
- aged ≥ 18 (adult age group),
- not having any psychiatric disorder diagnosis (Alzheimer, Parkinson etc),
- not being drug – addicted .

Experimental interventions

The music intervention consisted of Turkish soft Music (Hicaz and Zirefkend music) and it was decided upon based on the opinion of academics of the State Conservatory of Turkish Music of the University of Gaziantep. A central music system was utilized but not headphones. Music played between 21:00-01:00 every night at bedtime for seven consecutive seven days. Members of the control group did not receive any intervention, but participated in the pre-and post-intervention assessment and were encouraged not to use music a bedtime. The music group patients were asked to listen, especially the advised music and were also encouraged not to use relaxation techniques or do physical activity in bedtime.

Measures

The PSQI is a commonly used questionnaire that measures self-reported sleep habits and can be completed in a short time. It gives information about the participant's perceived sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, daytime dysfunctions and use of sleep medication. These seven components form a global score that ranges between 0 and 21; the score for each component ranges from 0 to 3. Buysee et al. (1989) reported that score of 5 (indicating poor sleep) yielded a diagnostic sensitivity of 89.6% and a specificity of 86.5% and that the scale had good internal consistency, with a = 0.83. A global PSQI score >5 is indicative of severe sleep difficulties in at least two areas (Buysee et al, 1989).

The Visual Analogue Scales-VAS in order to record patient satisfaction was also used in order to collect data with the help of literature and similar research. The data were collected by the researcher with a face-to-face interview method.

Data Collection

At the beginning of the study baseline data were collected using the PSQI and participants were randomly assigned to one of the two groups. During the following week, patients in the MT group were listened an audio. At the end of the intervention; both music group and control group completed PSQI. Also VAS was completed by music group too.

Ethical considerations

The study was approved by the appropriate ethics committees. All participants received an explanation of the study before participating, gave written informed consent before voluntary participation and were assured of their freedom to withdraw from the study at any time. Confidentiality was strictly maintained at all times.

Data analysis

Statistical evaluation was carried out with SPSS (Statistical Package for Social Sciences) software. A Chi-square test, correlation analysis, significance test for population mean (one-sample t-test), test of significance for the difference between two means in dependent and independent groups, one way analysis of variance as well as other descriptive statistics were used in order to assess the data.

Results

Description of participants

When we analyzed the distribution according to the socio-demographic features of the research

patients, we found out that in the music group the mean age was 48.4 ± 2.4 years, 86.7 % of them were married, 40.0% had primary school graduation, 53.3% had an average income level, 63.3% did not work and 73.4% lived in the city center. As for the control group, the mean age was 44.4 ± 2.2 years, 93.3% of them were married, 53.3% had an average income level, 40.0 % were illiterate, 73.3% did not work and 56.7% lived in the city center.

It was revealed that 56.7 % of the patients of the music group had a cancer diagnosis for more than 1 year, 53.3% had stage IV breast-cancer, 93.3% had hospital experience previously, 46.7% had received chemotherapy and 63.3 % did not have any chronic disease. On the other hand, 56.7% of the patients of the control group had had a cancer diagnosis for more than 1 year, 56.7% had stage III breast-cancer, 96.7% had hospital experience previously, 40.0 % had received chemotherapy and 73.3% did not have any chronic disease.

Pretest scores

At pretest (first meeting) the global PSQI was completed by all participants. The global PSQI scores 8.8 ± 2.2 in the music group 9.7 ± 1.8in the control group (Table 1). These scores indicate some sleep difficulties. The independent t-tests showed no statistically significant pretest differences between the two groups in age, global PSQI score ($p > 0.05$). There were no statistically significant differences between the two groups in global PSQI scores.

PSQI and VAS outcomes in post-tests

Global sleep quality and VAS scores

We used t-tests for independent samples to compare weekly changes in global PSQI scores in the two groups, i.e. music and control. The magnitude of the difference between groups (music vs. control) was statistically significant after the second week (week 2, $p=0.000$). Improvement continued during the following week of the study (Table 2). Thus, listening to music has a cumulative effect on sleep quality.

It was found in the music group that 30.0 % were moderately satisfied with the music given and the mean VAS scores were 70.3 ± 3.0 (SD=16.45). Because the mean VAS scores were near 100, it was concluded that music-therapy given to the music group had a positive effect on patients and they were satisfied with the procedure.

When we analyzed satisfaction scores of VAS and PSQI scores after the music-therapy in the music group, there was a negative correlation between VAS scores and PSQI scores. However, we could not find any statistically significant difference ($r= -0.68$, $p=0.720$).

PSQI component scores

The music group had statistically significantly better scores on the six PSQI components during the one week. A paired samples t-test was used to compare pretest scores and week 1 scores within the music group. Listening to music resulted in improved subjective sleep quality, shorter sleep latency, longer sleep duration, better sleep efficiency, reduced sleep disturbances and less daytime dysfunction week by week; however, sleep duration showed a delayed effect since a statistically significantly longer sleep duration occurred during the second in the PSQI tests ($p<0.001$).

None of the PSQI components improved statistically significantly in the control group. We measured PSQI components at the pretest and post-test assessment in the control group as well, but found no statistically significant changes in any of the component scores.

Responders vs. non-responders

Similarly to Lai's study, we divided the participants into 'responders' and 'non-responders' after the intervention in the music and audiobook groups. Participants were considered responders if their total PSQI post-treatment scores dropped into the normal range (PSQI < 5). By the end of the study, 30 out of the 35 people (86%) in the music group responded to the intervention and became 'good sleepers', while five remained 'poor sleepers'. In the audiobook group there were nine 'responders' (30%), while 21 from this group (70%) remained in the 'poor sleepers' range at the end of the study.

There were differences in pretest scores between 'responders' and 'non-responders' from the music group. The pretest scores of the 'responders' were also statistically significantly lower on three of the six components of sleep

quality: perceived sleep quality, sleep latency and sleep efficiency ($p<0.05$). Lai and Good (2005) had the same results for pretest scores between 'responders' and 'non-responders'. In our study, there were nine 'responders' in the audiobook group at the end of the intervention, while 21 participants remained in the 'poor sleepers' range. Among 'responders', we did not find statistically significantly lower pretest scores for any components of sleep quality (Lai and Good 2005).

Table 1: Means of PSQI scores of the patients during hospitalization

Features	Group	N	Mean ± SD	t	p
Means of PSQİ scores at the first weekend of the hospitalization*	Music	30	8.8 ± 2.2	1.718	0.091
	Control	30	9.7 ± 1.8		

* The first week was the one during which no intervention was carried out

Table 2: Comparison of the PSQI score change in the experimental and control group

Features	Group	N	Mean ± SD	T	p
Means of PSQİ scores at the second weekend of the hospitalization *	Music	30	2.9 ± 0.9	29.404	0.000
	Control	30	11.3 ± 1.2		

* The second week was the one during which the intervention (music-therapy given to experimental group) was carried out.

Discussion

Breast cancer patients who used sedative music as therapy between 21:00-01:00 every night at bedtime for one week had better global sleep quality and also better individual components of sleep quality over time than those who did not. The exception was sleep disturbance. In addition, those who used music had beter global sleep quality at each of the weekly time points and better scores on four components: better perceived sleep quality, sleep latency, sleep efficiency, and less daytime dysfunction. There was also a delayed effect for sleep duration by week one and an increasing dose effect on overall sleep quality from the pretest until week one.

Our findings were similar to those in the five previous studies that used qualitative, quasi-experimental or experimental approaches. In the experimental study, music was used in the afternoon rather than at bedtime when sleep was measured. All two types of music in our study were used at bedtime and were found useful for sleep; the two types were similar in their effects. All those who received music reported listening to it every night (Zimmermann et al, 1996; Johnson, 2003; Eugenia, 2005; Abhijeet et al, 2009; Chan et al, 2010). Althoug Chan et al. (2010) have suggested that four weeks are needed to observe a new intervention for sleep quality, others have found effects after 3-day (Zimmerman et al. 1996) and 10-day periods (Johnson 2003) (Zimmermann et al, 1996; Johnson, 2003; Chan et al, 2010). In the present study, music as therapy between 21:00-01:00 every night at bedtime, along with brief instructions for relaxation, improved global sleep quality after 1 week. The daily sleep log showed good agreement with one week recall for the PSQI.

In the study of Hui-Ling et al. (2005) in which they provided a musical therapy to the experimental group of elderly people for 3 weeks

and measured the quality of sleep of the patients at the end of each week; it was found out that music was effective on 3 points. The quality of sleep in the music group improved more at the first week. Also, it continued to improve at the 2nd and 3nd week. It was discovered in the same study that notable improvements occurred in 3 subcomponents of the quality of sleep scale in the music group: the quality of sleep, duration of sleep and sleeping activity. Music was effective on subcomponents of the quality of sleep but did not reduce sleep disorder (Hui-Ling and Marion, 2005).

The results can be explained by the psychophysiological theory that sleep quality can be improved by relaxing the body with sedative music which decreases circulating noradrenaline that is related to sleep onset (Johnson, 2003; Lee, 2004). The timing of the intervention at bedtime, brief instruction and feedback, and use of music for 45 minutes may have facilitated relaxation as the person fell asleep (Johnson, 2003; Abhijeet et al, 2009; Chan et al, 2010; Wang et al, 2014).

Study limitations

The first limitation of our study is that participants were recruited as 'poor sleepers' (PSQI global score >5). They were breast cancer patients with some sleeping problems which can return into the normal range without any intervention. Secondly, we used self-report measures of sleep without verifying them objectively. Thirdly, a 1-week study period may not be sufficiently long to draw any conclusions about the sustainability of improved sleep on longer time periods. Finally, a Hawthorne effect may have occurred in the study. The Hawthorne effect refers to a phenomenon which is thought to occur when people observed during a research study temporarily change their behaviour and performance.

Future research

It is recommend that future research could investigate the effects of music on sleep quality for more than one week. Music has a cumulative effect of sleep quality and our findings suggest that all poor sleepers might become good sleepers with a longer music intervention. It is also necessary to investigate the effects of music using objective, physiological measures of sleep such as polysomnography. More research is needed to confirm the effectiveness of music on sleep quality in clinical populations such as in patients suffering from insomnia. However, it is difficult to find and enroll in a study patients suffering from insomnia who are medication-free.

What is already known about this topic

• Sleep disorders may result in fatigue, tiredness, depression and problems in daytime functioning.

• Music can reduce sympathetic nervous system activity, decrease anxiety, blood pressure, heart and respiratory rate and may have positive effects on sleep via muscle relaxation and distraction from thoughts.

• Control groups have not been used in previous research.

What this study adds

• Music had a positive effect on sleep quality.

• More research is needed to confirm the effectiveness of music on sleep quality in patients suffering from insomnia, and objective, physiological measures such as polysomnography should be used.

• Nurses could use this safe, cheap and easy to learn method to treat insomnia.

Conclusion

Our findings provide evidence for the usefulness of soft enstrumental music as an intervention for sleeping problems in breast cancer patients. In line with former studies, we confirmed that listening to soft enstrumental music has a positive effect on sleep quality. Hospitalized patients often suffer from sleeping problems, such as insomnia, and listening to music is a simple intervention that may reduce these problems. Nurses should use music therapy in their practice because it is a safe and cheap method which may be used to treat insomnia in different populations. In addition, the intervention is quick and easy to learn.

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Conflict Of Interest

No conflict of interest has been declared by the authors.

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