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The Effect of Sound Therapy on the Perceived Stress of Cancer Patients Undergoing Chemotherapy

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Abstract

Introduction: The diagnosis of cancer creates concerns for patients, which leads to severe psychological complications. The present study was conducted with the aim of determining the effect of sound therapy on the perceived stress of cancer patients undergoing chemotherapy.

Methods: This clinical trial study was conducted on 70 cancer patients undergoing chemotherapy at Dr. Ali Shariati Hospital in Fasa in 2018. Sampling was done by the convenience method and the samples were randomly divided into two control and test groups. The intervention group received the recitation of the Holy Quran, traditional music or heavenly prayers. The data collection tool was Cohen's Perceived Stress Questionnaire. Data analysis was done by SPSS software version 16 and using the statistical test of analysis of variance with repeated measurements along with Bonferroni's post hoc test.

Results: The mean age of the patients in the control and test groups were 38.03±14.18 and 41.31±10.86 years respectively. There was no significant difference between the mean of stress scores in the control group patients before and after the intervention ($p<0.05$). But the mean of stress scores in the test group patients decreased significantly after the intervention ($p<0.001$). Also, after the intervention, patients in the test group had lower mean stress scores compared to the control group ($p<0.001$).

Conclusion: Based on the results of the present study, sound therapy reduced the perceived stress of patients. Therefore, this non-invasive and uncomplicated method can be easily used by the treatment team to help reduce the stress of cancer patients.

Keywords: sound therapy, stress, cancer, chemotherapy.

Introduction

After cardiovascular diseases, cancer is the second cause of death in human societies and it is predicted that it will be the first and most important cause of death by 2030. According to the results of a systematic review in 2016, there were 17.2 million cases of cancer, 8.9 million deaths, and 213.2 million cases of disability due to cancer worldwide (1,2). During the years 2006 to 2016, a 28 percent increase in the incidence of cancer has been

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observed, which has increased the most in less developed countrie (3). Also in Iran, Abachizadeh et al. (2016) reported that due to demographic changes and increased life expectancy in the country, the incidence of cancer will reach 129,700 in 2025, from 84,800 in 2012. In fact, we will have a 35% increase in the incidence of people with cancer (4). Cancer as a negative stressor affects the patient not only physiologically, but also psychologically and socially (5,6). Stress is an important psychological issue in cancer patients during diagnosis, treatment and even after treatment of the disease (7). Crises caused by cancer including fear of death and recurrence of the disease, financial concerns and family problems cause changes in the path of personal life, relationships and family roles, job, daily activities, imbalance and disharmony of body and mind of the patient, which leads to an increase in hopelessness and severe stress in the patient and the occurrence and severity of mental disorders such as depression (8,9,10).

In addition to the potential threat to life caused by cancer diagnosis, the use of chemotherapy drugs for treatment is also accompanied by a series of side effects that can aggravate the stress of patients and disrupt their physical, social and performance (9). On the other hand, the results of most studies show that there is a relationship between stress and the incidence and recurrence of cancer (11), which ultimately affect the quality of life in patients (12,13).

Therefore, since it is necessary to maintain the patient's energy to continue living with a chronic disease such as cancer; it is necessary to provide solutions in order to reduce the physical and psychological symptoms and ultimately control the patient's stress. In this regard, various medicinal and non-medicinal methods can be used. Although it can be said that due to the cost and side effects of drugs and the dependencies that many painkillers and sedatives cause, non-pharmacological and complementary methods are preferable in this field. Using sounds like music is one of the complementary medicine treatments whose history of its use in the treatment of diseases goes back to the distant past. In Egyptian, Greek, Chinese and Indian inscriptions, sound in the form of music is mentioned as a healing tool. Nowadays, the results of studies also emphasize on the effect of pleasant sound stimuli in the form of soothing music on patients' anxiety (14).

One of the types of music is the sound resulting from the recitation of the Holy Quran, which is considered as one of the most beautiful manifestations of the Quran due to its pleasant music with special properties and special rhythm (15). The Quran, as one of the highest aspects of mysticism and religious music, has always been the focus of Islamic sages and doctors and has been used for various patients. The word of God, with its abundant penetrating power, affects the soul and body as if a newly born person feels a sense of lightness, vitality and freedom from materialistic bondages and removes fear and anxiety from the heart after listening to it. It creates peace in the listener. The results of various studies have also shown that the sound of the Holy Quran can be an effective and safe intervention in the field of solving many problems of patients, such as reducing stress, irritability, reducing feelings of loneliness, improving mood and regulating emotions (16).

Therefore, the present study was conducted with the aim of determining the effect of audio therapy on the perceived stress of cancer patients undergoing chemotherapy due to several reasons. They include, first, the prevalence of cancer in the world including Iran and its impact on the psychosocial health of patients. Second, providing care and comfort to patients as one of the nurses' duties considering the priority of interventions to provide care for patients is non-pharmacological. And third, the acceptance rate of non-

pharmacological treatments is different among cultures, ethnicities and specific social conditions and the type of disease.

Materials and Methods:

This randomized controlled clinical trial study was conducted with the aim of determining the effect of sound therapy on the perceived stress of cancer patients undergoing chemotherapy. The statistical population of this research was made up of all cancer patients undergoing chemotherapy referred to Dr. Ali Shariati Hospital in Fasa in 2017. The sample size was determined based on the following formula and considering the confidence level of 95%, the power of 80% and the acceptable difference equal to 10 yeilding 70 patients (35 in test and control group each) (16).

$$\frac{\left(Z_{1-\alpha/2}+Z_{1-\beta}\right)^2 * 2 * \sigma^2}{d^2}$$

Sampling was done using convenience method and based on the study inclusion criteria. These criteria include: 20-70 year olds, having Iranian nationality, willing to participate in research, suffering from cancer for at least 6 months, having literacy and full consciousness, being hospitalized for at least 4 weeks, undergoing chemotherapy and not having hearing problems. The exclusion criteria were changes in the patient's condition (death, travel, transfer, and unconsciousness of the patient); so that it is not possible for them to continue their cooperation. The research samples were divided into two groups using a simple random method (lottery). In this method, first the names of the samples were written on a sheet and a code was assigned to each one.

Data collection was done using demographic and clinical information form and Cohen's Standard Perceived Stress Questionnaire. The demographic and clinical information form included questions about age, gender, education level, employment status, number of children, family history of cancer and duration of the disease.

Perceived stress questionnaire was created by Cohen et al. in 1983. This questionnaire has 14 items with a five-point Likert scale (from Never to Very much) and each item has a value between 0 and 4. This questionnaire measures perceived stress by questions such as: Over the last month, to what extent have you been upset because of a problem that you did not expect?. Over the last month how much have you felt that you were unable to cope with accumulated problems? In negative questions, scoring is done in reverse.

Finally, the perceived stress score is divided from 0 to 100 into three levels: low (0 to 33), medium (34 to 66) and high (67 to 100). Cohen et al. obtained the reliability of this tool by calculating Cronbach's alpha in three studies, 0.84, 0.85 and 0.86 (17). In Iran, in the research of Saadat et al., the validity of the mentioned questionnaire has been confirmed by professors and experts in the field. Also, the reliability of the questionnaire was obtained using Cronbach's alpha method above 0.70. (18).

In the present study, the researcher, after obtaining the code of ethics and permission from the Islamic Azad University (IAU), Isfahan (Khorasgan) branch and the authorities of the research environment, referred to the oncology department of Dr. Ali Shariati Hospital in Fasa. First, the researcher explained the research objectives to the patients. Then, 70 volunteer patients with cancer undergoing chemotherapy were selected based on the inclusion criteria. Informed consent was obtained from all samples. Before randomly assigning patients to groups, demographic information forms and perceived stress questionnaire were completed by the subjects. Then, they were divided into two groups, test and control, using the randomization method. In the test group, sound therapy intervention was used, and

the control group received the hospital's routine interventions. Three CDs with musical content of traditional Iranian instrumental (piano, tambur, setar, guitar, etc. without any vocals), Quran anthology (Surah Al Fath, Al-Ikhlas, Ansharah, Al-Kawthar, Al-Ala, Al-Balad, Al-Inshiqaq, Al-Fajr, Al-Qadr, At-Takwir) and the heavenly prayers (the prayer of Tawasl, Miraj, Amin Allah and Faraj) were presented and recited to the patients of the test group. They could choose one of the CDs and listen to it. The aforementioned CDs and the selection of surahs were designed based on the service package of the Ministry of Health, using the Quranic Virtues of Noormohammadi, the Mofatih Novin book by Ayatollah Makarem Shirazi, and the book by Mesbah Kafami Aamili. The selected instrumentals were played four days a week and for one hour each time (preferably from 17:00 to 18:00 in the afternoon, due to the calmness of the evening, the absence of visitors and also the absence of interference with the patients' drug injection hours) during 4 weeks (19). It was played through headphones for each subject in the test group. At the end of the intervention period, the perceived stress questionnaire was completed again by both groups.

In order to comply with ethics in research, the code of ethics under the number IR.IAU.KHUISF.REC.1397.239 was obtained from the Research Ethics Committee of Islamic Azad University, Isfahan (Khorasgan) branch. Also the objectives of the research and the study method were explained to the patients. Patients were free to participate in the research or withdraw. The information of the participants was kept completely confidential.

The analysis was done at two descriptive and inferential levels. At the descriptive level, mean and standard deviation were used, and at the inferential level, the analysis of variance test with repeated measures was used. Bonferroni's post hoc test was used for pairwise comparisons. Before using the repeated measures test, the assumption of normality of the data was checked and confirmed by the Kolmogorov Smirnov test and the assumption of homogeneity of variance between the two groups was checked and confirmed by the Levine test. Data analysis was done at the five percent error level using SPSS software version 16.

Results:

The mean age of the participants in the test and control groups was 41.31±10.86 and 38.04±14.18 respectively. The mean duration of their illness was 1.38±1.17 and 1.41±1.20, respectively. The demographic and clinical characteristics of the research samples are shown in Table 1. The two groups were homogeneous in terms of demographic and clinical characteristics (P>0.05).

Table1: Demographic and clinical characteristics of participants in two groups

Variables	Category	Control group	Test group	Test statistics	P value
Age (years) (Mean±SD)	---	38.04±14.18	41.31±10.86	T=1.069	0.289
Gender N (%)	Female	17 (48.6)	18 (51.4)	χ^2= 0.019	0.890
	Male	18 (51.4)	17 (48.6)		
Level of education N (%)	Under high school diploma	15 (42.8)	13 (37.2)	U=522.500	0.625
	High school diploma	7 (20)	9 (25.6)		

	Above high school diploma	13 (37.2)	13 (37.2)		
Occupation N (%)	housewife	6 (17.2)	9 (25.7)	Fisher exact test	0.257
	Employee	8 (22.9)	9 (25.7)		
	freelance job	11 (31.4)	11 (31.4)		
	Student	6 (17.1)	2 (5.8)		
	Others	4 (11.4)	4 (11.4)		
Number of children (Mean±SD)	---	1.66±2.09	1.88±1.81	U=500.500	0.433
Family history of cancer N (%)	Yes	12 (34.3)	11 (31.4)	χ^2= 0.000	0.994
	No	23 (65.7)	24 (68.6)		
Duration of illness (Mean±SD)	---	1.41±1.22	1.38±1.06	U=549	0.889

The mean score of perceived stress of patients in two groups is shown in Table 2. According to the results of this table, the mean score of perceived stress in the control group before and after the intervention was 34.57±3.99 and 37.47±6.23 respectively. However, in the test group, before and after the intervention was 34.97±3.11 and 22.56±6.23 respectively.

Based on the results of the analysis of variance with repeated measures, in the variable of perceived stress, the effects of time (p<0.001, F=112), group (p<0.001, F=29) and the interaction effect Time and group (p>0.001, F=125) were significant. The results of Bonferroni's post hoc test related to the interaction effect showed that in the control group, the mean score of perceived stress between pre-test and post-test was not significantly different (p=0.674), while in the test group, the mean score of perceived stress after the test was significantly lower than the pre-test (p<0.001). In addition, by performing inter-group comparisons, it was found that in the pre-test stage, the mean of stress score in the control group was significantly lower than the test group patients (p=0.007), but in the post-test, the mean of stress score in the test group was significantly lower than control group patients (p<0.001).

Variable	**Time** / **Group**	**Before intervention**	**After intervention**	**Results of analysis of variance with repeated measures**		
Perceived stress		Mean (SD)	Mean (SD)	Time	Group	Group time interaction effect
	Test	34.97 (3.11)	22.56 (6.23)	<0.001	<0.001	<0.001
	Control	34.57 (3.99)	37.47 (6.23)			

Discussion:

Based on the results of the present study, the level of perceived stress in cancer patients was at an average level. Patients suffering from different types of cancer have different degrees of mental disorders. They range from depression, anxiety, incompatibility with the disease and reduced self-confidence to emotional disorders, fear of disease recurrence and death (20). The results of various studies also show the prevalence of stress and anxiety in these patients, which can be due to the psychological reaction to the disease, the direct physiological effect of the cancer itself, or drug treatment (11). The results of Konor et al. study

have shown that stress increases the level of depression, anxiety disorders and other forms of psychiatric problems in patients with breast cancer. This can have a direct physiological effect on the functioning of the immune system. Also, by reducing the body's resistance, the person becomes susceptible to physical and mental disease exacerbation (21), all of which are in line with the present study and indicate the presence of stress in cancer patients.

Based on other results of the present study, sound therapy reduced the perceived stress of patients. The effect of music therapy on reducing anxiety and pain during breast cancer diagnostic or therapeutic surgery has also been proven in the study of Palmer and colleagues in 2015 (22). In line with the results of the present study, the findings of Alex et al. studies on 30 female patients undergoing coronary angiography and 30 female patients with cancer in a hospital in Kerala, India also show the effect of music on reducing the average scores of anxiety, stress and depression in the intervention group (23). In the same context, the results of the study by Warez and Joshi, in line with the current study, indicated the effectiveness of music therapy on anxiety and depression of patients (24). In research conducted by Tahan et al., they concluded that music therapy significantly reduced the stress of patients in the test group compared to the previous intervention (25).

One of the factors affecting stress is religion and religious beliefs (26). In this context, the sound of the Qur'an as a pleasant mystical music has always been the focus of researchers (16). According to Shamsi et al. study, creating stress is the result of not recoursing to God. When a person has full faith and trust in the wise creator, he will not have anxiety and worry about the events that have happened, he will leave the matters that are beyond his control to God, and he will be less stressed (26). In the current study, part of the audio therapy intervention was in the form of Quranic sounds and divine prayers. The results showed the effectiveness of these sounds in reducing the stress of patients. In accordance with these results, the results of the studies by Asadi et al. and Kohestani et al. also show the effectiveness of Quranic verses in improving the physical and mental health of patients (27,28). Of course, in the present study, the samples voluntarily chose one of the sounds of the Holy Quran, traditional music, and heavenly prayers, and the data analysis was not done separately by sound type. Therefore, it is possible that this has influenced the results.

One of the limitations of the present study was the impossibility of random selection of research samples. Also, there was no possibility of blinding in the present study. Gathering data through questionnaires and self-reports can be another limitation because the psychological conditions of the samples at the time of completing the questionnaires could have influenced their accuracy.

Conclusion:

According to the results of the present study, cancer patients had a moderate level of stress at the beginning of the study, but after the implementation of sound therapy, the stress level decreased, which indicates the effectiveness of sound therapy in reducing the perceived stress of cancer patients who were undergoing chemotherapy. Since sound therapy is a non-invasive method with no side effects, it can be added to other standard care related to cancers in hospitals to help reduce the stress of cancer patients.

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Conflict of Interest

According to the authors, this article has no financial support or conflicts of interest to declare.

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