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Effect of instrumental music on anxiety and depression among hemodialysis patients: A randomized controlled trial

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Abstract:

BACKGROUND: Hemodialysis patients suffer from mental disorders such as anxiety and depression. One of the known nonpharmacological methods to eliminate these disorders is music therapy. The present study aimed to investigate the effect of instrumental music on state depression and anxiety in hemodialysis patients.

MATERIALS AND METHODS: This study was a clinical trial. The population was hemodialysis patients in Hamedan in 2017 and 50 patients were selected and randomly divided into experimental and control groups. The duration each time of the instrumental music intervention for the experimental group was 3 weeks, 3 times a week for 20 min. Data were measured by beck depression inventory and SpeilBerger State-Trait Anxiety Inventory-Y1 before the intervention and immediately after the last intervention and analyzed using Yates correction, Chi-square test, Mann-Whitney *U*-test, independent *t*-test, and Wilcoxon test.

RESULTS: No significant difference between the intervention and control groups was observed before the study in terms of demographic variables ($P > 0.05$). In the intervention group, the mean and standard deviation of the depression score before the intervention was 8.99 ± 23.68 and after the intervention reached 7.54 ± 14.88 , which shows that the variable was significant ($P = 0.001$); however, no significant difference was observed in the control group. In the intervention group, the mean of state anxiety before the intervention was 10.05 ± 53.76 and after the intervention reached 9.76 ± 42.48 , which was statistically significant ($P = 0.004$), while no significant difference was observed in the control group.

CONCLUSION: The results indicate the positive effect of instrumental music on reducing anxiety and depression in hemodialysis patients. It is recommended that this therapy be used as a nursing method to reduce state anxiety and depression in hemodialysis patients.

Keywords:

Clinical trial, depression, hemodialysis, music therapy, state anxiety

Introduction

Chronic renal failure is a known structural or functional disorder that lasts for at least 3 months and is associated with renal damage known as persistent albuminuria or decreased glomerular filtration rate of <60 mg/min.^[1] This disease is a global health problem^[2] and is the second leading cause of death after acquired immunodeficiency syndrome.^[3] About

10% of the world population is affected with chronic renal failure, which is one of the 20 leading causes of death in the world.^[4] Approximately more than 500 million people worldwide suffer from one kind or another of kidney injuries. In Iran, the patient population with renal failure is 320 thousand people; 48% of whom use hemodialysis.^[5]

Patients with chronic renal failure, in addition to numerous physiological changes, often

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have a negative perception of their treatment, describe the time spent on hemodialysis treatment as negative and worthless, and express psychological symptoms such as anxiety, stress, depression, and low quality of life.^[6-9] Prolonged dialysis in these patients causes many negative emotions such as anger, fatigue, dissatisfaction, and frustration.^[10] Depression and anxiety are among the most common mental disorders in patients with chronic renal failure undergoing hemodialysis.^[11,12] If these disorders are not timely diagnosed and managed in hemodialysis patients, it will lead to low quality of life, poor adherence to hemodialysis treatment, and increased mortality of patients.^[13]

Hemodialysis requires treatment because of its widespread complications. Pharmacological therapy methods have side effects; therefore, the use of alternatives such as music, relaxation, and hypnosis have been suggested.^[14] Music therapy is a simple, inexpensive, noninvasive method without side effects and is one of the valuable measures taken in nursing that has a high ability of eliminating fear and anxiety.^[15,16] Music, as a therapy, refers to the use of therapeutic potential of a piece of music or a played song meaning that the therapeutic effects obtained depend on the rhythm and melody of the music.^[17] Music conveys human feeling, emotion, perception, and cognition only by the sound of the instrument, without the need for speech and language,^[18] and inspires liveliness and vitality accompanied by stability and relaxation away from excitement and impatience.^[19] Music therapy can play an important role in reducing depression and anxiety and improve the health process of patients.^[20]

The use of music for relaxation and patient convenience is an issue that has received much attention. Zadbagher *et al.* in a study to evaluate the effectiveness of music therapy on state anxiety and depression in patients with MS showed that the mean scores of depression and anxiety in the experimental group in the posttest and follow-up phase was significantly different from the control group. This indicated that the mean scores of depression and anxiety was, indeed, reduced by music therapy.^[21] The results of the Zhou *et al.* study on the effect of music therapy on anxiety showed that depression in breast cancer patients enjoyed improvement of depression and anxiety in the experimental group.^[22] The results of the Gutiérrez and Camarena study entitled "The Effect of Music Therapy on Patients with Anxiety Disorders" showed that music therapy is effective in reducing patient anxiety.^[23]

Literature review showed that hemodialysis poses several challenges for patients. Therefore, considering the role of music therapy in reducing anxiety and depression, this study was conducted as one of the

first research projects, in Iran, to investigate the effect of instrumental music on depression and overt anxiety among hemodialysis patients. Music therapy plays a role in the cognitive, physical, mental, and emotional health of people and strengthens their mental, spiritual, and physical health. It also protects people from sadness, guilt, and loneliness and can be used to fight unpleasant feelings and reduce feelings of loneliness among patients and those depressed. Despite the importance of music therapy, in Iran, few studies have been conducted with this approach. Moreover, few studies have addressed the effect of music therapy on depression and anxiety among hemodialysis patients.

Materials and Methods

Study design and setting

This study is a single-blind, randomized controlled clinical trial; code IRCT20170619034641N3, which measured the effect of instrumental music on state anxiety and depression in hemodialysis patients in medical centers of Hamadan Province in 2017.

Study participants and sampling

The study population included all patients hospitalized in the dialysis ward of Shahid Beheshti Hospital in Hamadan Province. Sample size was 50 people; two groups of 25 people, based on the formula of comparing a quantitative characteristic in two groups and based on a reliability of 95%, test power of 90%, and on the results of the study by Heshmatifar *et al.* with regard to 10% probable loss.^[24] Persons were selected by the available sampling method and then randomly allocated to the two groups. In this way, 50 consecutive numbers were separately written on paper and thereafter placed in a container; selected even numbers went to Group A (control) and selected odd numbers to Group B (intervention) [Figure 1]. To equalize the number of selections in the groups, the removed numbers were not returned to the container.

The inclusion criteria considered in this study were as follows: Being a fully conscious patient, between the ages of 30 and 65 years old, having mild to moderate depression, able to read and write, having hemodynamic stability, and having no vital signs fluctuations. Other inclusion factors were the gaining of a score of 30 or higher on the Spielberger Anxiety Inventory, having at least 3 years of dialysis experience, having an active record at a dialysis center, being no guest or period dialysis patient, and having no physical disability or chronic illness. The exclusion criteria included patient unwillingness to continue the study, patient death, the use of sedatives and anti-anxiety drugs, kidney transplantation or the use of peritoneal dialysis methods, drug addiction, history of epilepsy, history of thyroid

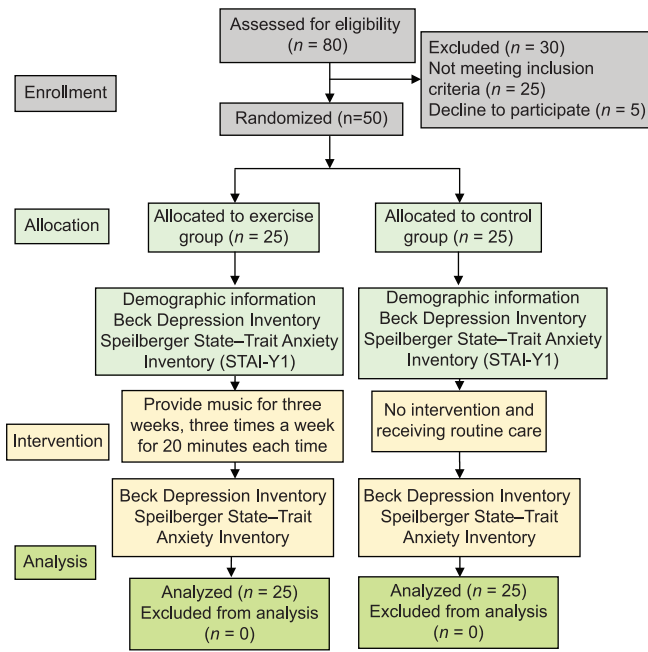


Figure 1: Consort flow diagram of the study

disease and use of effective medications, being pregnant, and having no habit of, or a reluctance to, listening to music.

Data collection tool and technique

Data collection tools included a form of demographic information (age, gender, marital status, level of education, occupation, duration of illness, and duration of dialysis treatment) using the Beck Depression Inventory (BDI) and Spielberger State-Trait Anxiety Inventory-Y1.

Beck depression inventory

This questionnaire consists of 21 questions that ask participants to express their negative emotions on a four-choice scale of “never = 0” and “always = 3.” In this questionnaire, the rate of depression is the same score that is obtained by the participants after completing the BDI form rated from 0 to 63. The reliability of this questionnaire in different references has been calculated at 86%.^[25]

Spielberger state-Trait anxiety inventory-Y1

This questionnaire consists of 20 questions that ask participants to determine the intensity of their emotion and incidence of negative emotions on a four-choice scale (never = 1, very much = 4). To score the Spielberger Inventory, each phrase scores from 1 to 4. In this questionnaire, the rate of state anxiety is the same score obtained after completing the Spielberger Inventory obtained in three levels of mild anxiety (20–31), moderate to low anxiety (32–42), moderate to high anxiety (43–53), or relatively severe anxiety (54–64),

severe anxiety (65–75), and very severe anxiety (76–80).^[26] The reliability of this questionnaire in different references has been calculated at 87%.^[27]

Demographic information and anxiety rate before hemodialysis were measured by Spielberger Anxiety Inventory and Depression was measured by the BDI questionnaire when instrumental music from Mozart, Piano Sonata No. 19 (Sonata K576), which is a monophonic classical piece of music. This music was played for 3 weeks, three times a week, for 20 min each time for patients in the intervention group. No intervention was performed for the control group. Immediately after the last 20-min intervention, which was performed three weeks later, the rate of depression was measured using the BDI and state anxiety was measured using the Spielberger Anxiety Inventory. After starting this work, data were collected every working day of the week from 8 to 12 in the morning.

Statistical analysis was performed using the SPSS software version 23 (IBM Inc., Chicago, IL, USA). The Yates continuity correction, Chi-square test, Mann-Whitney U-test, and independent *t*-test were used to evaluate the similarity (homogeneity) of demographic variables between the intervention and control groups. The Shapiro-Wilk test was used to evaluate the normality status of the scores of the state anxiety and depression scale. The Mann-Whitney test, independent *t*-test, and Wilcoxon test were used to evaluate the mean changes in intervention and control groups.

Ethical consideration

Sampling began after obtaining a confirmation code from the Ethics Committee of Kermanshah University of Medical Sciences, No. kums. rec. 1397.032, obtaining a study permit from the officials of Shahid Beheshti Hospital, and by observing the ethical standards of clinical trial studies. After expressing the aim of the study and the characteristics of the research samples to the head of the ward, eligible patients were selected from the list of hospitalized patients. Prior to the intervention, those eligible to participate in the study were fully informed of the objectives of the study, of the mechanics of the work, that their information would be kept confidential, and that they would be given the choice to leave the study if they wished. The researcher provided the necessary explanations on how to conduct the research, complete the questionnaires, insured confidentiality of information, and stated that there was no need for them to mention their names. After obtaining informed written consent, sample selection, receiving patient information and clinical history using their files, the study began one hour before participation of patients who were awaiting or fully prepared for hemodialysis.

Results

Patients in two control and intervention groups were homogeneous in terms of demographic characteristics. Of the 50 patients studied, 27 patients (54%) were female, 43 patients (86%) were married, and 19 patients (38%) had an academic education [Table 1].

The results showed that there was no statistically significant difference between the patients of the control and intervention groups in terms of mean depression score before the intervention ($P = 0.84$). After the intervention, a significant difference in the mean score of depression was observed between the two control and intervention groups ($P = 0.001$). In the intervention group, the mean score of depression before music therapy was 23.8, which decreased to 14.7 after the intervention and was statistically significant ($P = 0.001$). There was no significant difference in the mean depression score in the control group before and after the intervention ($P = 0.64$).

There was no statistically significant difference in state anxiety between patients in the two control and intervention groups before the intervention ($P = 0.54$). After the intervention, a significant difference in the mean score of state anxiety was observed between the two control and intervention groups ($P = 0.001$). In the intervention group, the mean score of state anxiety before the intervention was 53.10, which decreased to 42.9 after the intervention and was statistically significant ($P = 0.001$). There was no significant difference in the mean score of state anxiety in the control group before and after the intervention ($P = 0.20$) [Table 2].

Discussion

One of the results in this study showed a decrease in the mean score of depression after music therapy, while in the control group before and after the intervention, no significant difference was observed. Similar to our results,

the Zhou *et al.* study showed that instrumental music causes improvement in and reduction of depression and anxiety in women with breast cancer.^[22] The results of Chen *et al.* also showed that music therapy in the experimental group causes significant score reduction regarding depression.^[28]

In another study conducted by Kousha and Varasteh on women with depression, the results showed that the mean score of depression decreased after intervention using music.^[29] The De la Rubia Ortí *et al.* study on effectiveness of music therapy on Alzheimer patients showed that music therapy significantly reduces depression.^[30] The effect of music on reducing depression and anxiety has been shown in several other studies as well.^[19,22,31-33] However, in the Kwon *et al.* study on patients with leg fractures, there was no significant difference between the intervention and control groups in terms of depression rate,^[34] which is not consistent with our results. The reason for this discrepancy can be related to the method of conducting the intervention, which consisted of only three sessions once a day, and the music was not played for a sufficient duration to affect the patients.

Another result of the study showed a decrease in the mean score of state anxiety after music therapy, while in the control group before and after the intervention, no significant difference was observed in the mean score. Similar to our results, Arvand *et al.* in a study on women with irritable bowel syndrome found that the difference between the mean score of anxiety before and after the intervention in the intervention group was significant, which indicates the effect of music therapy on reducing anxiety.^[35] Erkkilä *et al.* in a study on patients with anxiety also concluded with the group that received music therapy having a significant advance in anxiety improvement compared to the group that received various routine care.^[33] Results of the Jasemi *et al.* study on people with cancer showed

Table 1: Comparison of demographic information of two intervention and control groups

Variable	Dimensions	Intervention group, n (%)	Control group, n (%)	P
Gender	Male	14 (56)	13 (52)	0.77 ^a
	Female	11 (44)	12 (48)	
Marital status	Single	2 (8)	5 (20)	0.20 ^b
	Married	23 (92)	20 (80)	
Education	Under diploma	11 (44)	6 (24)	0.11 ^a
	Diploma	8 (32)	6 (24)	
	University	6 (24)	13 (52)	
Job	Unemployed	7 (28)	7 (28)	0.94 ^a
	Employee	11 (44)	12 (48)	
	Homemaker	7 (28)	6 (24)	
Age	Mean±SD	57.76±6.74	56.21±6.60	0.65 ^c
Duration of dialysis	Mean±SD	29.02±7.68	28.92±7.02	0.48 ^d

^aChi-squared test, ^bYates correction test, ^cIndependent t-test, ^dMann-Whitney U, P significant at $P < 0.05$, SD=Standard deviation

Table 2: Mean and standard deviation of the variables in the control and intervention groups before and after the intervention

Variables	Stages	Mean±SD		P
		Intervention group	Control group	
Depression	Before intervention	23.8±68.99	23.2±72.82	0.84 ^a
	After intervention	14.7±88.54	22.6±92.75	0.001 ^a
	P	0.001 ^b	0.64 ^b	-
Anxiety	Before intervention	53.10±76.05	55.7±80.98	0.54 ^a
	After intervention	42.9±48.76	54.6±64.35	0.001 ^c
	P	0.001 ^c	0.20 ^b	-

^aMann-Whitney U, ^bWilcoxon test, ^cIndependent t-test, P significant at P<0.05. SD=Standard deviation

that the rate of anxiety was significantly reduced as a result of music therapy in the intervention group.^[36] Numerous other studies have also shown the effect of music on reducing anxiety.^[37-39] Contrary to our results, Krishnaswamy and Nair conducted a study on people with cancer and the results obtained from the study showed that the reduction of the anxiety score in the experimental and control groups after music therapy was not statistically significant.^[40] The reason for this difference may be related to the small sample size considered in the study.

Limitations

Uses of self-report tools, nonuse of indicators related to the main disease, poor staff cooperation, patient impatience with filling out the questionnaire, moving headphones over the ears while listening to music, and interrupting music due to manipulation of headphones by the patient were among the problems and limitations of this study.

Conclusion

The results of this study show that music therapy can reduce anxiety and depression in patients undergoing hemodialysis, which can be done as a nursing method for these patients during hemodialysis, and since the implementation of this method is low cost, comfortable, and without side effects, it can be selected as one of the hemodialysis ward therapies. Therefore, educating nurses of hemodialysis patients to be alert to the issue of anxiety and depression incorporating the implementation and mechanism of the effect of music therapy on patients can be considered by the relevant managers and policy-makers.

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Conflicts of interest

There are no conflicts of interest.

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