The Effect of Music Therapy on Fatigue and Anxiety Levels in Hemodialysis Patients

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ABSTRACT

This research was carried out to determine the effect of music therapy to fatigue and anxiety levels in hemodialysis patients. Research was carried out as a semi-experimental model with pre-test-post-test control group. The study was composed of patients treated in the dialysis service at Gazi Yasargil Training and Research Hospital in Diyarbakır, Turkey), from December 2018 - January 2020. 120 patients, 60 experimental and 60 control groups, were participated. Patient Information Form, Fatigue Severity Scale, State-Continuity Anxiety Scale were applied to the experimental and control groups after pre-test, after music therapy to experimental group. While, Fatigue Severity Scale, Statefulness-Continuity Anxiety Scale was applied to control group one week later without any intervention. In the analysis, T test was used in dependent and independent groups. The mean fatigue intensity score of patients in experimental group decreased from 54.78 ± 6.39 before intervention to 23.45 ± 4.44 after intervention. There was a significant difference between mean scores. Experiment and control groups were compared and found that there was significant difference between groups. In the study, it was found that levels of fatigue severity and state anxiety of individuals with dialysis patients decreased after music treatment.

Keywords: Dialysis, Stress, Anxiety, Fatigue, Music Therapy, Nursing

PRELIMINARY

Dialysis patients need to deal and cope with various aspects of their disease (Parvan *et al.,* 2015). Stress is a common and important psychological problem among these patients (Rostami *et al.,* 2015). Dialysis patients are prone to various complications such as physical, economic, social and psychological problems which can result in psychopathological complications. Hemodialysis as a solution for patients with chronic renal failure is a stressful process (Espahbodi *et al.,* 2015). Intradialytic events, such as cramping, loss of consciousness, bleeding, and allergic reactions, are major stressors for persons on hemodialysis (Johnson *et al.,* 2019).

Hemodialysis improves renal function and increases lifetime. However, it causes a fundamental change in the whole life of patients (Ghiasi *et al.,* 2021). Dialysis is a lifelong treatment required by end stage renal disease patients who are not able to undergo renal transplantation. Dialysis impacts the patients' quality of life drastically, increasing the risk of mortality. Depression and anxiety are commonly reported among dialysis patients (Semaan *et al.,* 2018). Despite the effectiveness of hemodialysis in renal failure, patients are exposed to stressors such as death anxiety (Sadeghi *et al.,* 2015). Hemodialysis patients may experience mental disturbances, social isolation, loneliness, helplessness, and hopelessness (Sadoughi & Hesampour, 2017).

Individuals who are diagnosed with end-stage renal disease undergo major changes in lifestyle (Rajan & Subramanian, 2016). Hemodialysis patients have to combat certain negative effects such as sexual dysfunction (Yaqoob *et al.,* 2020). Insomnia, anxiety, and fatigue are more common in hemodialysis patients than in healthy people and affect patients' quality of life (Amini *et al.,* 2016). Anxiety is

characterized by disruptive feelings of uncertainty, dread, and fearfulness. A variety of common medical complaints may be manifestations of an anxiety disorder, including palpitations, tremors, indigestion, numbness/tingling, nervousness, shortness of breath, diaphoresis, and fear (Cohen *et al.,* 2016). Up to 50% of patients undergoing hemodialysis suffer from symptoms of depression and/or anxiety. Access to traditional pharmacotherapies and psychotherapies for depression or anxiety in this patient population has been inadequate (Thomas *et al.,* 2017). Depression is common in dialysis patients and has been shown to be associated with higher morbidity and mortality (Ng *et al.,* 2015).

Psychological stressors lead to poor compliance treatment regimens and as a result more mortality and hospitalization of patients (Hashemi Fesharaki *et al.,* 2016). If anxiety disorders of hemodialysis patients is not treated, biochemical reactions will happen due to adrenaline increase which have negative effects on their treatment (Kiani *et al.,* 2016). Patients on hemodialysis need to manage the stress of having a life-threatening condition (Kim & Yang, 2015).

Effective coping strategies are shaped by various factors (Alnazly, 2016) Happiness is one of the most important human psychological needs that plays a key role in the formation of a person's character and mental health (Frad Tabatabaei & Raghibi, 2017). Research into the relationship between happiness and health is developing rapidly (Steptoe, 2019). Happiness is a lasting state and is associated with the absence of negative emotions, the presence of positive emotions, life satisfaction, social engagement and objectives in life. Researchers have demonstrated the benefits of happiness in many aspects of life. Great thinkers, philosophers, scientists, and artists from history have often been concerned about one of the most important elements of life: happiness (Garaigordobil, 2015).

Numerous trials identified the importance of psychogenic and emotional etiological factors, and this is obvious in clinical practice. Although relaxation techniques are frequently recommended (Lahmann *et al.,* 2010). Individuals undergoing dialysis have a lower quality of life and non-pharmacological complementary practices have proved to be effective and was associated with reductions in anxiety and depression scores, complications and improvements in quality of life (Morais *et al.,* 2020). Alternative therapy methods such as progressive relaxation, deep breathing exercise, therapeutic touch, and music treatment have been used as independent nursing initiatives to help fulfill the physical, emotional, and psychological requirements of the patients (Cantekin & Tan, 2013).

Music is known from literature to influence and dampen anxiety and tension and has been used for millennia in the treatment of illness (Gross *et al.,* 2010). Providing music during hemodialysis is an effective complementary therapy to relieve the frequency and severity of adverse reactions, as well as to lower salivary cortisol levels. Differences in salivary cortisol after music therapy may predict cardiovascular mortality in patients under maintenance hemodialysis (Hou *et al.,* 2017). From total 10 studies including total 722 participants were analysed systematically in a study (Cheng *et al.,* 2021). Music therapy resulted with a significant favorable effect on pain reduction of hemodialysis patients.

This study was conducted to determine the effect of music therapy on fatigue and anxiety levels in hemodialysis patients.

MATERIALS and METHODS

The research is a pre-test/post-test controlled quasi-experimental model. The research was conducted on patients registered in the dialysis unit of Diyarbakır Gazi Yasargil Training and Research Hospital, Public Hospitals Institution of Turkey, between December 2018 and October 2020. In "Diyarbakır Training and Research Hospital" dialysis unit, 1 internist, 2 nephrology specialists, 2 general practitioners, 5 dialysis technicians and 30 dialysis nurses work between 8 am and 5 pm. The nurses working in the unit have a hemodialysis (HD) certificate. There were also 6 rooms in the unit, 4 rooms

for HD patients who do not have contagious diseases, and separate rooms for hepatitis B and hepatitis C patients. There were 30 HD machines in the rooms where patients without contagious diseases were admitted, and 1 HD machine in each room where patients with hepatitis B and hepatitis C were admitted. Routine examinations of the patients were carried out in the emergency room. Patients were evaluated daily by general practitioners and hemodialysis nurses, and twice a week by nephrologists.

Research hypotheses:

H0-a: Music therapy does not affect the anxiety levels of hemodialysis patients.

H1-a: Music therapy affects anxiety levels of hemodialysis patients

H0-b: Music therapy does not affect the fatigue level of hemodialysis patients

H1-b: Music therapy affects the fatigue level of hemodialysis patients

Population and Sample of the Research

The universe of the study consisted of 120 patients registered in Diyarbakır Training and Research Hospital dialysis service between the data collection dates. In the study, the sample selection was not conducted, the patients who met the inclusion and exclusion criteria were included in the study and produced the whole population. Patients who underwent dialysis on Monday, Wednesday and Friday, and patients who entered dialysis on Tuesdays, Thursdays and Saturdays were included in the experimental group. The study was applied to 120 patients, 60 of which were in the experimental group and 60 in the control group.

As the criteria for inclusion in the research; patients aged 18 years and over who were able to communicate verbally, who did not receive music therapy before, who received regular hemodialysis treatment for at least 6 months, who underwent dialysis three times a week, were identified and included in the study. Exclusion criteria in the study were patients have severe hearing loss.

Data collection tools

Data were collected using the Patient Information Form, Fatigue Severity Scale, State and Trait Anxiety Scale, developed by the researcher. The Patient Information Form used in the study was prepared by the researcher in line with the literature, taking into account similar studies in which patients undergoing dialysis treatment were evaluated. It was composed of 14 questions containing information about age, gender, marital status, education level, occupation, employment status, place of residence, economic status, with whom he lived, from whom he received support, year of hemodialysis and existing systemic diseases (Gagner-Tjellesen *et al.,* 2001).

The Fatigue Severity Scale is one of the most frequently used scales in the evaluation of fatigue. It was developed by Krupp *et al.* (1989). In this study, the Fatigue Severity Scale and the Cronbach Alpha coefficient were found to be 0.83. Each item is graded from 1 to 7. Strongly disagree with the situation was determined by 1, strongly agree with 7. The score obtained by summing all the scores obtained for each condition was 36 or more, and it was accepted as "tired" in accordance with Çoban, (2005).

The State-Trait Anxiety Inventory used in the study was developed by Spielberger (Spielberger *et al.* 1970). The state anxiety inventory determines how individuals feel at a certain moment and under certain conditions. Trait anxiety inventory generally determines how the individual feels, regardless of the situation and circumstances. The inventory has two separate scales with 20 items each. These were the State Anxiety Inventory and the Trait Anxiety Inventory. The scores obtained from both scales theoretically vary between 20 and 80. A higher score indicates higher anxiety, a lower score indicates a lower level of anxiety. The values found for the reliability of the trait anxiety scale were between 0.83 and 0.87, and between 0.94 and 0.96 (Cronbach-Alpha) for the state anxiety scale (Oner & Le Compte, 1983). In this study, the Cronbach-Alpha value of the Trait Anxiety Scale was found to be 0.78, and the Cronbach-Alpha value of the State Anxiety Scale was found to be 0.86.

Data Collection

The data were collected by the researcher in the HD unit, while the patients were in their beds during the dialysis session. The data were collected from patients registered in the dialysis service of Diyarbakır Gazi Yasargil Training and Research Hospital, Public Hospitals Institution of Turkey, between May 2019 and August 2019, in an average of 45 minutes using face-to-face interview technique. The time period the patients were in the hospital was preferred for listening to music and filling out the questionnaires. The questions in the questionnaires were filled by the patients in about 10-15 minutes by marking the most appropriate answers for them. As a pre-test, the experimental group was administered the Patient Identification Form, the Fatigue Severity Scale and the State-Trait Anxiety Scale. Then for three weeks, three days a week, half an hour a day, "Rast" and "Ussak" maqams were played via Mp3 players. After the concert on the last day, the Fatigue Severity Scale and the State-Trait Anxiety Scale were applied to collect post-test data from the experimental group.

Patient Information Form, Fatigue Severity Scale and State-Trait Anxiety Scale were administered to the control group as a pre-test. Afterwards, no intervention was made for three weeks, but routine nursing interventions were applied. At the end of three weeks, Fatigue Severity Scale and State-Trait Anxiety Inventory were applied to collect post-test data from the control group.

Nursing Initiative

In the nursing intervention, mp3 player, music therapy CDs of "Rast" and "Ussak" maqams were used as intervention materials. Before loading the music therapy tracks on the CDs onto the Mp3 player, the patients were asked about their preferences, and they were loaded in line with their preferences and given to the patients. Mp3 players and headphones provided by the researcher were used for patients with Mp3 players and headphones, and for patients without Mp3 players and headphones.

The musical maqams (Rast and Ussak) used in the study were determined in line with the information of Inonu University Fine Arts Faculty Music Department faculty members and CDs were obtained by ordering from the official website.

It was explained to the patients in the experimental group that music therapy would be applied three times a week during the dialysis session, and Mp3 players were listened to under the supervision of the researcher. The two determined music genres (Rast and Ussak maqam) were played for 30 minutes in each session (3 times a week) for three weeks with Mp3 in order for the patient to get away from the environment and focus on the music patient was listening to. And the scales were applied again immediately after the third music therapy application. In the literature, it was stated that listening to music for a long time will cause discomfort in patients, therefore it is appropriate to listen to music for 15-30 minutes. While listening to music, the most suitable method is Mp3 and headphones to prevent being affected by the environmental sounds (Krupp *et al.,* 1989).

Since the patients in the control group recieved dialysis on separate days, they were not informed about the treatment with music. The patients in the control group were not visited by the researcher for three weeks, and routine nursing interventions were applied.

Variables of the Study

Independent Variables: Music therapy practice given to patients by the researcher

Dependent Variables: Fatigue Severity Scale mean score and State and trait anxiety scale mean score.

Control Variables of the Study: Demographic characteristics (age, gender, marital status, education level, occupation, employment status, place of residence, economic status, with whom he lived, from whom he received support, year of hemodialysis and existing systemic diseases).

There was no statistically significant relationship between the individuals in the experimental and control groups participating in the study, according to their gender, age, marital status, education

status, employment status, occupation, economic status and people they live with (p > 0.05). Hemodialysis patients in the experimental and control groups were found to be similar in terms of control variables.

It was determined that there was no significant relationship between the individuals in the experimental and control groups in terms of the year of entering hemodialysis, the type of chronic disease and the supporting person (p > 0.05). It was determined that the patients in the experimental and control groups were similar in terms of control variables.

Evaluation of Data

The analysis of the data was done in the computer environment with the SPSS (Statistical Package for the Social Sciences) 22.0 ready-made statistical program. The results were evaluated at the 95% confidence interval and the significance level at p < 0.05. In the evaluation of the data, analyzes, evaluation of the descriptive characteristics of the experimental and control groups (percentage, mean and standard deviation), comparison of Control Variables of experimental and control groups(chi-square,fisher exact test), comparison of the mean scores of the experimental and control groups (T test in dependent groups), inner comparison of the mean scores of the experimental and control groups (T test in dependent groups), determining the relationship between fatigue severity and state anxiety level of the experimental group pretest-posttest (pearson correlation) were used.

Ethical Principles of Research: Written permission was obtained from the Diyarbakir Training and Research Hospital Chief Physician and Malatya Clinical Research Ethics Committee before the study was conducted. Written informed consent was obtained from the patients by informing the patients about the study, explaining the purpose, duration and procedures of the study. After the end of the study, a music CD prepared by the researcher was given to the patients in the control group.

Limitations of the Research: Since the study was limited to a single center, the results of the study can only be generalized to this research group**.**

RESULTS

Distribution of Demographic Characteristics of Hemodialysis Patients

Of the patients in the experimental group, 68.3% were women, 63.3% were aged 25-64, 78.3% were married, 66.7% were literate, 53.3% were housewives, 95% were unemployed, 63.3% live in the city, 75% have medium financial status, 76.7% live with their spouse and children, 91.7% were recieving support. Also, 55% of the patients in the control group were women, 50% were between the ages of 25-64, 70% were married, 46.7% were literate, 40.0% were housewives, 95% were unemployed, 91.6% were living in a city, 51.7% had a distressed financial situation, 66.7% were living with their spouse and children, and 83.3% were recieving support.

It was determined that 46.6% of the patients in the experimental group received hemodialysis for 1-4 years, 35.3% had diabetes, 36.7% were receiving support from their spouse and children, 50% of the patients in the control group received hemodialysis for 1- 4 years, 43.3% had diabetes and 28.3% received support from their mothers and siblings.

Distribution of Anxiety Levels of Hemodialysis Patients

When the difference between the pre-intervention and post-intervention mean scores of the patients in the experimental group was examined; while the mean state anxiety score of the patients in the experimental group was 52.52 ± 7.83 before music therapy, it was found that this value was 26.57 ± 5.16 after music therapy and the difference between the in-group total mean scores was statistically significant (p < 0.001) (Table 1).

Table 1. Comparison of the Pre-Test-Post-Test Mean Scores of the State Anxiety Scale of the Patients in the Experimental Group

State	Pre-Test $\overline{X}\pm$ SS	Post-Test $\overline{X}\pm$ SS	p value
Experimental group	52.52 ± 7.83	26.57 ± 5.16	t = 22.330, p= 0.0001

When the results of the difference between the pre-test and post-test State Anxiety Scale total score averages of the patients in the control group were examined; It was determined that the pretest state anxiety total score average of the patients in the control group was 53.42 ± 3.99, while the posttest total score average was 53.78 ± 3.79 and the difference between the averages was not statistically significant (p > 0.05) (Table 2).

Table 2. Comparison of the Pre-Test-Post-Test Mean Scores of the State Anxiety Scale of the Patients in the Control Group

State	Pre-Test $\overline{X}\pm$ SS	Post-Test $\overline{X}\pm$ SS	P value
Control Group	53.42 ± 3.99	53.78 ± 3.79	t=15.760, p= 0.120

In the comparison of the state anxiety mean scores of the patients in the experimental and control groups between the groups; while the mean state anxiety pretest total score of the patients in the control group was 53.42 ± 3.99, the total mean score of the experimental group pretest score was 52.52 ± 7.83 and the difference between the mean was not statistically significant (p > 0.05). The state anxiety posttest total mean score of the control group was 53.78 ± 3.79, posttest total mean score of the experimental group was 26.57 ± 5.16 and the difference between the total mean scores between the groups was statistically significant (p < 0.001) (Table 3).

Table 3. Comparison of the State Anxiety Scale Pre-Test-Post-Test Mean Scores of the Patients in the Experimental and Control Groups

Application Time of the Scale	Experimental group (n=60)	Control group (n=60)	P value
	x̄ ± SS	x̄ ± SS	
Pre-Test	52.52 ± 7.83	53.42 ± 3.99	t= -2.450, p= 0.090
Post-Test	26.57 ± 5.16	53.78 ± 3.79	t=-21.290, p=0.0001

In the comparison of the groupsof trait anxiety mean scores of the patients in the experimental and control groups; while the mean state anxiety test total score of the patients in the control group was 48.65 ± 3.01, it was found that the total mean test score of the experimental group was 49.40 ± 5.37 and the difference between the mean scores was not statistically significant (p > 0.05) (Table 4).

Table 4. Comparison of the Continuity Anxiety Scale Pre-Test Mean Scores of the Patients in the Experimental and Control Groups

Application Time of the Scale	Experimental group (n=60)	Control group (n=60)	P value
	x̄ ± SS	x̄ ± SS	
Pre-Test	49.40 ± 5.37	48.65 ± 3.01	t= -2.450, p= 0.090

Comparison of Fatigue Levels of Hemodialysis Patients

In the comparison of inner group fatigue severity score averages of the patients in the experimental group; while the mean fatigue severity score of the patients in the experimental group before music therapy was 54.78 ± 6.39, this value was 23.45 ± 4.44 after music therapy, and the difference between the in-group total score averages was statistically significant ($p < 0.001$) (Table 5).

Table 5. Comparison of Pre-Test-Post-Test Mean Scores of the Fatigue Severity Scale of the Patients in the Experimental Group

Fatigue	Pre-Test $\overline{X} \pm SS$	Post-Test $\overline{X} \pm SS$	P value
Experimental group	54.78 ± 6.39	23.45 ± 4.44	t= 30.920, p= 0.0001

For the in-group comparison of the fatigue severity score averages of the patients in the control group; it was determined that the pretest fatigue severity total score average of the patients in the control group was 55.62 ± 3.07, while the posttest total score average was 55.42 ± 3.08 and the difference between the averages was not statistically significant ($p > 0.05$) (Table 6).

Table 6. Comparison of Pre-Test-Post-Test Mean Scores of the Fatigue Severity Scale of the Patients in the Control Group

Fatigue	Pre-Test $\overline{X} \pm SS$	Post-Test $\overline{X} \pm SS$	P value
Control Group	55.62 ± 3.07	55.42 ± 3.08	t=7.120, p= 0.140

In the comparison of the fatigue severity score averages of the patients in the experimental and control groups between the groups; While the mean fatigue severity pretest total score of the patients in the control group was 55.62 ± 3.07, the total mean score of the experimental group pretest score was 54.78 ± 6.39 and the difference between the mean was not statistically significant ($p > 0.05$), while the mean fatigue severity posttest score of the control group was 55.42 ± 3.08, it was determined that the posttest total mean score of the experimental group was 23.45 ± 4.44, and the difference between the total mean scores between the groups was statistically significant ($p < 0.001$) (Table 7).

Table 7. Comparison of the Fatigue Severity Scale Pre-Test-Post-Test Mean Scores of the Patients in the Experimental and Control Groups

Application Time of the Scale	Experimental group (n=60)	Control group (n=60)	P value
	x̄ ± SS	x̄ ± SS	
Pre-Test	54.78 ± 6.39	55.62 ± 3.07	t= -3.060, p= 0.120
Post-Test	23.45 ± 4.44	55.42 ± 3.08	t= -44.020, p= 0.0001

The Relationship Between Experimental Group Fatigue Severity Scale and State Anxiety Scale Pre-Test-Post-Test Mean Scores

In the experimental group, there is a significant difference between the Fatigue Pre- and Post-test scores and the State Anxiety Scale Pre- and Post-test scores, as shown in Table 9. It was determined that there was a moderately significant positive correlation between the fatigue pretest score and the state anxiety pretest score in the experimental group ($p < 0.01$), there was no significant relationship between the fatigue posttest score and the state anxiety posttest score after the treatment with music in the experimental group ($p > 0.01$) (Table 8).

Table 8. The Relationship Between Experimental Group Fatigue Severity Scale and State Anxiety Scale Pre-Test/Post-Test Mean Scores

N=60	State Pre-Test	Fatigue Pre-Test	State Post-test	Fatigue Post-Test
1 State Pre-Test	1			
2 Fatigue Pre-Test	0,326**	1		
3 State Post-test	0,085	-0,019	1	
4 Fatigue Post-Test	-0,215	-0,017	0,128	1

DISCUSSION

The Effect of Music Therapy on Anxiety Level in Hemodialysis Patients

Studies in the literature have reported that music therapy is effective in reducing the level of anxiety in ill individuals (Burrai *et al.,* 2014). It has been determined that the level of fatigue decreased and the quality of life of the patients increased in hemodialysis patients to whom music therapy was applied (Yıldırım Usta & Demir, 2014).

According to the results; the decrease in the mean scores of the State Anxiety Scale after music therapy applied to hemodialysis patients reveals that the music therapy is effective. This result supports the hypothesis (H_{1-a}) that "music therapy affects the anxiety level of patients on hemodialysis".

The Effect of Music Therapy on Fatigue Level in Hemodialysis Patients

As a result of the research, the fatigue level of the patients who received hemodialysis treatment decreased after music therapy. Azak and Altındağ-Dündar showed that music therapy has a positive effect on fatigue in HD patients. Yıldırım-Usta and Demir (2014), in their study with hemodialysis patients, applied music therapy to hemodialysis patients with previously recorded music, and as a result of the research, they determined that stress and fatigue levels were reduced in the experimental group. In these studies, they determined that music causes relaxation and relaxation during the

treatment of hemodialysis patients, and that listening to music has a reducing effect on the anxiety levels of patients.

The decrease in the Fatigue Severity Scale score averages after music therapy applied to hemodialysis patients reveals that the music therapy is effective. These results support the hypothesis (H_1-b) that "music therapy affects patients' fatigue level in hemodialysis patients".

CONCLUSIONS

In an experimental study conducted to determine the effect of music therapy on anxiety levels and fatigue severity in hemodialysis patients, it was determined that post-intervention state anxiety levels of hemodialysis patients in the experimental group decreased compared to the pre-intervention state and their state anxiety levels were positively affected. In the hemodialysis patients in the control group, the difference between the State Anxiety pre-test and post-test mean scores was not statistically significant.

In the hemodialysis patients in the experimental group, post-intervention fatigue severity levels decreased compared to the pre-intervention situation, and it was determined that fatigue severity levels were positively affected. In hemodialysis patients in the control group, the difference between the fatigue pretest and posttest mean scores was not statistically significant.

In the study, it was determined that music therapy application decreased the severity of fatigue and the level of anxiety state in hemodialysis patients. Fort his aim, nurses should participate in training programs on the application of music therapy. This may give a new perspective to the nursing care given in the treatment of hemodialysis patients, and nurses should counsel and guide hemodialysis patients about the application of music therapy.

Declaration

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