# The Effect of Music on the Sleep Quality and Vital Signs of the Chronic Renal Failure Patients Who are Getting Hemodialysis Treatment

## Hemodiyaliz Tedavisi Olan Hastalarda Müziğin Uyku Kalitesi ve Yaşam Bulgularına Etkisi

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**ABSTRACT Objective:** The aim of this study is to determine the effect of music, which they were made listen to, on the sleep quality and vital signs of the patients with chronic renal failure who are getting hemodialysis treatment. **Material and Methods:** This study was planned as a randomized controlled and experimental clinical study which conducted between the dates of March 15-November 30, 2010 in the nephrology service. In total, 70 patients, who were suitable for the sample selection criteria and who gave consent to participate in the study, were included in the research sample; 35 of them being experimental group patients, and 35 of them being control group patients. The sample size was calculated with power analysis. Individual introduction questionnaire, Pittsburgh Sleep Quality Index (PSQI) which measures the sleep quality, and patient monitoring form for monitoring the findings, were used in the collection of data. Experimental group patients were listened to Turkish Art Music for 30 minutes for 4 days in the evening before they go to sleep. Systolic and diastolic blood pressures, pulse rates and breathing rates were measured and recorded for 4 days before (0. min) and just after the music (30. min). Sleep quality was evaluated by using PSQI. In patients in the control group, systolic and diastolic blood pressures, pulse rates and breathing rates were measured and recorded for 4 days in the 0. and 30. minutes for this group by considering the hour in the experimental group after (30.min) and before (0. min) the patients were listened to music in that group. PSQI was reapplied after 4 days from the first interview, and the quality of sleep was reevaluated. **Results:** In the patients in the experimental group, systolic and diastolic blood pressure, pulse and breathing rates show a decrease in the 30. minute just after they were being listened to music for 4 days. The mean PSQI score of the patients in the experimental group at the end of the 4th day (5.97±1.20) was found to be lower than their mean PSQI score at the 1st day (9.80±1.57). The mean PSQI score of the patients in the control group at the end of the the 4th day (10.97±1.76) was found to be higher than their mean PSQI score at the 1st day (9.86±1.87). **Conclusion:** Music theraphy may be used as an efficient intervention which decreases vital signs and increases the sleep quality in the patients who are getting hemodialysis treatment.

**Key Words:** Music therapy; sleep; vital signs; kidney failure, chronic; renal dialysis

**ÖZET Amaç:** Bu çalışmanın amacı, hemodiyaliz tedavisi alan kronik böbrek yetersizliği olan hastalara dinletilen müziğin hastaların uyku kalitesi ve yaşam bulgularına etkisini incelemektir. **Gereç ve Yöntemler:** Bu çalışma, randomize kontrollü ve deneysel bir klinik çalışma olarak planlanmıştır. Araştırma, 15 Mart-30 Ekim 2010 tarihleri arasında nefroloji servisinde yürütülmüştür. Araştırmanın örneklem seçim ölçütlerine uyan ve araştırmaya katılmaya gönüllü olan 35 deney (müzik dinletilen), 35 kontrol (müzik dinletilmeyen) grubu hastası olmak üzere toplam 70 hasta çalışmaya alınmıştır. Örneklem büyüklüğü, power analizi ile hesaplanmıştır. Verilerin toplanmasında birey tanıtım formu, uyku kalitesini ölçmek için Pittsburgh Uyku Kalitesi İndeksi (PUKİ) ve yaşamsal bulguların takibi için hasta izlem formu kullanılmıştır. Deney grubundaki hastalara 4 gün boyunca, uyumadan önce 30 dk süresince Türk Sanat Müziği dinletilmiştir. Deney grubundaki hastaların 4 gün boyunca her gün, müzik dinletmeden önce (0. dakika), müzik dinletildikten hemen sonra (30. dakika) sistolik ve diyastolik kan basıncı, nabız hızı ve solunum hızı değerleri ölçülüp kaydedilmiştir. Uyku kalitesi PUKİ kullanılarak değerlendirilmiştir. Kontrol grubundaki hastalara 4 gün boyunca deney grubundaki hastaların müzik dinletildikten sonraki (30. dk) ve dinletilmeden önceki (0. dk) saat göz önünde bulundurularak 0., ve 30. dakikalarda sistolik ve diyastolik kan basıncı, nabız hızı ve solunum hızı değerleri ölçülüp kaydedilmiştir. İlk görüşmeden 4 gün sonra PUKİ tekrar uygulanarak, uyku kalitesi tekrar değerlendirilmiştir. **Bulgular:** Deney grubundaki hastalarda, müzik dinletildikten hemen sonra 30. dakikada 4 gün boyunca, sistolik ve diastolik kan basıncı, nabız ve solunum hızı değerleri düşüş göstermiştir. Deney grubundaki hastaların 4. günün sonundaki PUKİ puan ortalaması (5,97±1,20), 1. gündeki PUKİ puan ortalamasına (9,80±1,57) göre düşük bulunmuştur. Kontrol grubundaki hastaların ise 4. günün sonundaki PUKİ puan ortalaması (10,97±1,76), 1. gündeki PUKİ puan ortalamasına (9,86±1,87) göre yüksek bulunmuştur. **Sonuç:** Müzik tedavisi hemodiyaliz tedavisi olan hastalarda yaşam bulgularını azaltan ve uyku kalitesini arttıran etkili bir girişim olarak kullanılabilir.

**Anahtar Kelimeler:** Müzik terapisi; uyku; yaşam bulguları; böbrek yetmezliği, kronik; böbrek diyalizi

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Chronic renal failure, is a quite frequently-seen important health problem. In the world, end-stage renal failure develops in 50-250 people among each one million people.[1-3] In the USA, more than 220.000 people were diagnosed with end-stage renal failure (ESRF) in 2003.[4,5] According to the records of the Turkish Nephrology Society in Turkey, total number of patients who were given hemodialysis treatment was 49.404, and the number of patients who were given constant peritone dialysis from their feet was 5.105 in 2011.[6]

In the patients with ESRF who are treated with dialysis, it was reported that there were sleep problems in the rates of 30-70% or higher.[7-10] One or more subjective sleep complaints were shown especially in more than three quarters of the hemodialysis patients with ESRF.[11]

Limitations in life, disease-induced metabolic changes, pain, dietary restrictions, dyspnea, fatigue, cramps, aging, chronic metabolic acidosis associated with hypocapnia, the use of acetate dialysis, the presence of peripheral neuropathy affecting the nerves of the upper respiratory tract and emotional problems may cause sleep problems in the hemodialysis patients. Moreover, it was reported that in the patients with ESRF there is an abnormal tendency to fall asleep is due to cellular production of interleukin, and hemodialysis causes sleep problems through the disposal of these substances that cause drowsiness.[11,12]

Korkut determined that 78% of the patients in his study of subjective sleep quality had sleep disorders.[13] Yong et al. found the number of patients with sleep problems as 61.9% in his study of the 179 patients on dialysis with ESRF and determined that sleep deprivation was among the most intensely-seen first five symptoms.[10]

Vital signs are indicators of the basic functions of the body. There are four main vital signs which are evaluated by the health care professionals. Vital signs may be beneficial in the recognition, detection and monitoring of medical problems. The nurse should be aware of the environmental conditions that create change in the vital signs of the individual and she should be able to get them under control.[14,15] In patients with chronic renal failure undergoing hemodialysis, sleep problems and the deviations in the vital signs affect the quality of life of these patients a lot. The limitations seen in the drugs which are used in the treatment of insomnia and the deviations seen in the vital signs, the presence of side effects and the requirement of patients to use these drugs permenantly helped the development of non-pharmacological treatment methods.[4]

In recent years, the researchers have stated that there is close relationship between music and health care functions, it may be used in all areas of health and it is a painless, safe, cheap treatment method with no side effects.[16-18] Music therapy is the application of a musical activity on the basis of psyhodinamic, humanistic and interpersonal individual and group approaches.[19] Music therapy creates the feeling of relaxation and draws the attention to another direction with the effect of tempo and rhythm on the hyphothalamic and limbic system. These systems are known to reduce the activity of the neuroendocrine system and the symphatic nervous system. Decreased neuroendocrine activity reduces the release of corticotropin (adrenocorticotropin, ACTH) and the stress response. Reduction in sympathetic activity; reduces the blood pressure, heart rate, breathing rate and it creates the feeling of relaxation.[20] Lee et al. found in their study with patients receiving mechanical ventilation support that level of anxiety, respiratory rate, systolic-diastolic blood pressure, heart rate of the experimental group decreased significantly after music intervention.[21] Pothoulaki et al. found in their research in which they tried to find out the effect of music in eliminating pain and anxiety of the hemodialysis patients that the pain and anxiety rate in the control group patients which were not being listened to music was higher.[22]

Music is capable of providing a deep level of relaxation. It is known that it has a mitigating effect on insomnia.[23] Niet et al. found in their study in which they examined the effect of sleep quality in elderly individuals that sleep problems decreased in the patients who were listened to traditional folk music with mp3 player 2 to 3 times per week for 20 to 45 minute periods of time.[24] Music as a nurs-

ing intervention may be simple to use and is worth trying. Thus, the purpose of this article was to assess the effects of music therapy on the sleep quality and vital signs in hemodialysis patients.

The research hypotheses were the following:

The music has effect on sleep quality and vital signs at the patients getting hemodialysis treatment.

The music has no effect on sleep quality and vital signs at the patients getting hemodialysis treatment.

## MATERIAL AND METHODS

### RESEARCH DESIGN

This study was conducted as a randomized controlled and experimental clinical study.

### PARTICIPANTS

This study was conducted between the dates of March 15-November 30, 2010 in the nephrology service on the patients with chronic renal failure who are undergoing a hemodialysis treatment. Nephrology service in which the study is conducted has 30 beds. Patient rooms consist of two beds, five beds normal room, and special room which has one bed. Within the period of the study, 310 patients that have been treated with hemodialysis hospitalized. Patients under treatment in nephrology service and at the same time undergoing a hemodialysis treatment were included in this study as sleep quality of the patients were going to be evaluated. Patients did not listen to music at their own homes. Because it was thought that there may be a number of variables which affect listening to music at their homes. Inclusion criteria are as follows: (1) who is 18 year old and above; (2) who continued treatment with hemodialysis for 6 to 12 months; (3) who had no sleeping pill before and after being listened to music and (4) who can communicate, having no problem of hearing and speaking. In the literature, it is reported that sleep problems due to the diasese process and the treatment are often more intense after 6-12 months in patients undergoing hemodialysis treatment. So this was taken as the criteria for inclusion.[9,11] Because the lenght of hospital stay can affect the sleep problems, patients with similar lenght of (14-24 days) hospital stay was included the study.

The sample size was calculated with power analysis. 32 patients were found to be included in each group with the assumption that there was a 0.80 difficulty value, 0.05 miscalculation level and 1.1 points of difference. While the statistical comparison between groups was made, it was found suitable to include 35 patients in the experimental and control groups in order to have a equable distribution and the study was conducted with 70 patients; 35 of them being in experimental group and 35 of them being in the control group. After taking a patient to the experimental group, a patient having the similar features (Table 1) from the aspect of basic variable taken to the control group. This was continued until reached the size of the sample.

### MEASURES

Individual Introduction Questionnaire, which was prepared by the researcher using literature and similiar studies and which include the socio-demographic features and information about the diseases, Pittsburgh Sleep Quality Index (PSQI) which measures the sleep quality, and Patient Monitoring Form were used in the collection of data.[1-4,9,11-13] A separate spyhgmomanometer provided with calibration, headline and manometer and a stethoscope were used for measurements of the blood pressure of the patients in the experimental and control groups.

Individual Introduction Questionnaire consists of 30 questions which includes the socio-demographic features of the individual (1-9$^{th}$ questions), information about the disease (10-18$^{th}$ questions), sleep habits, sleep problems, causes (19-27$^{th}$ questions), and information about music (28-30$^{th}$ questions).

The Pittsburgh Sleep Quality Index was developed by Buysse for the evaluation of sleep quality in pyschiatric applications and clinical research in 1989.[25] The validity and reliability studies of this scale for Turkey were made by Agargun et al. in 1996 and the Cronbach's alpha reliability coefficient of the scale was found as 0.80.[26]

**TABLE 1:** Comparison of demographic characteristics between groups.

| | Experimental group (n=35) | | Control group (n=35) | | Total | | Chi-squares test | |
|---|---|---|---|---|---|---|---|---|
| **Demographic Characteristics** | **n** | **%** | **n** | **%** | **N** | **%** | **$X^2$** | **p-value** |
| Age group[a] | | | | | | | | |
| 18-28 | 6 | 17.1 | 4 | 11.4 | 10 | 14.3 | | |
| 29-39 | 3 | 8.6 | 4 | 11.4 | 7 | 10.0 | | |
| 40 and over | 26 | 74.3 | 27 | 77.1 | 53 | 75.7 | | |
| Gender | | | | | | | | |
| Women | 15 | 42.9 | 15 | 42.9 | 30 | 42.9 | 0.000 | 1.000[b] |
| Men | 20 | 57.1 | 20 | 57.1 | 40 | 57.9 | | |
| Education | | | | | | | | |
| Illiterate | 12 | 34.3 | 10 | 28.6 | 22 | 31.4 | 0.735 | 0.947[b] |
| Literate | 8 | 22.9 | 8 | 22.9 | 16 | 22.9 | | |
| Primary education | 5 | 14.3 | 7 | 20.0 | 12 | 17.1 | | |
| Secondary education | 6 | 17.1 | 7 | 20.0 | 13 | 18.6 | | |
| Higher education | 4 | 11.4 | 3 | 8.6 | 7 | 10.0 | | |
| Marital status | | | | | | | | |
| Married | 27 | 77.1 | 26 | 74.3 | 53 | 75.7 | 0.078 | 0.780[b] |
| Single/widow | 8 | 22.9 | 9 | 25.7 | 17 | 24.3 | | |
| Occupation[a] | | | | | | | | |
| Retired | 9 | 25.7 | 9 | 25.7 | 18 | 25.7 | | |
| Officer | 2 | 5.7 | 2 | 5.7 | 4 | 5.7 | | |
| Housewife | 15 | 42.9 | 14 | 40.0 | 29 | 41.4 | | |
| Worker | 2 | 5.7 | 4 | 11.4 | 6 | 8.6 | | |
| Student | 3 | 8.6 | 2 | 5.7 | 5 | 7.1 | | |
| Self-employed | 4 | 11.4 | 4 | 11.4 | 8 | 11.4 | | |

[a]: $X^2$ test was not applied. It was shown as a numeric and proportional table; [b]: p>0.05.

Pittsburgh Sleep Quality Index evaluates the sleep quality in the previous month. Total score has a value of 0-21 points. Total score being higher indicates a poor sleep quality.

Seven components of PSQI are standardized adaptations of the most emphasized points during the clinical interviews made with the patients who have complaints of insomnia or excessive sleeping. These components are; perceived sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, sleep medication use and day sleep dysfunction. PSQI, gives the qualitative measurement of the sleep quality which allows the identification of the "good sleep" and "bad sleep". PSQI is both simple and widely usable for both clinical and research purposes in the pyshiatry and general medical applications.[26]

The Patient Monitoring Form hemodynamic values about the systolic and diastolic blood pressure, pulse rate and breathing rate which were obtained just before the start of the patient's music therapy and at the end of the music theraphy in the 30$^{th}$ minute.

## MUSIC

Music was listened to by using an mp3 player with headphones. Headphone was used to provide focus, and to block the sounds coming from outside and causing a distraction. Patients were listened to the instrumental pieces of the Turkish art music from the tune zirgüleli hicaz and zirefkend, which relaxe the individual, give peace, have soothing sounds fit for each other and have the highest sleep over effect from night till the morning, for 30 minutes before they go to sleep. This type of music, due to being a specific type of music belonging to the Turkish culture was selected under the assumption that it may have a positive contribution on the mental processes of the patients. For the selection

of the type of music, interviews were conducted with the teaching staff of İnönü University Faculty of Fine Arts and İnönü University State Conservatory, and proposed type of music was chosen. There is literature about the impact force of Hicaz Tune to be more on urogenital system and kidneys.[27] Therefore, standard type of music was selected rather than the selection of individual patient.

### PREPARATION PHASE OF THE PATIENTS BEFORE LISTENING TO MUSIC

The room temperature was brought to normal values (approximately 22 degrees),

The patient was provided to wear a comfortable outfit, bedgown or pyjamas while lying,

The patient was told to take comfortable lying position,

The patient preferably lay down on the bed in a comfortable position and in a dim environment,

The patient was asked to close his eyes,

The patient was told to loosen his facial muscles,

Patient's mouth and mouth around was told that need to release,

It was told that to leave his arms loose,

The music was volumed up easily to hear,

The patient was told to give up minding problems while listening to music.[28]

### PROCEDURE

In the first interview made with the patients in the experimental group, Individual Introduction Questionnaire and PSQI scale were applied on the patients. Next, patients were listened to music with mp3 players for 30 minutes (tune zirgüleli hicaz and zirefkend) for 4 days in the evening before they go to sleep (between 9.00 p.m and 01.00 a.m). At the end of the 4th day, PSQI scale was reapplied to determine the effect of music on the quality of sleep. Systolic and diastolic blood pressures, pulse rates and breathing rates were measured and recorded for 4 days before (0. min) and after the music (30. min). Blood pressure, pulse rate and breath rate values were noted recorded by the researcher after measured.

In the first interview made with the patients in the control group, Individual Introduction Questionnaire, which included the socio-demographic features and information about the diseases, was applied on the patients and PSQI scale was applied to determine the sleep of quality. Systolic and diastolic blood pressures, pulse rates and breathing rates were measured and recorded for 4 days in the 0. and 30. minutes for this group by considering the hour in the experimental group after (30. min) and before (0. min) the patients were listened to music in that group. PSQI was reapplied after 4 days from the first interview, and the quality of sleep was reevaluated.

### DATA ANALYSIS

Statistical evaluation of the data obtained from the study was made with the SPSS 13.0 (Statistical Package for Social Sciences) software package program.

Chi-square test was used for the comparison of demographic and clinical characteristics the experimental and the control group. For the experimental and control groups, paired t-test was applied to assess the score difference between the total PSQI and PSQI sub-components between the 1st day and at the end of the 4th day. Paired t-test was applied to assess the difference between the vital signs of the experimental group before (0. minute) and after (30. minute) they were listened to music. Independent t-test was applied to assess the difference between the mean PSQI scores of the experimental and control groups obtained in the 1st day and at the end of the 4th day.

### ETHICAL CONSIDERATIONS

The Ethic Committees of the School of Nursing and of the Hospital approved the research. Patients were informed and their consent was taken verbally and in writing after the first meeting with the researchers. Permission was taken from Agargun by e-mail for the PSQI scale.

## RESULTS

This study was conducted with a total of 70 patients. In the study 35 experimental, 35 control

groups patients were included. No statistically significant difference was found between the patients of experimental and control group in the aspect of the socio-demographic features (p>0.05) (Table 1). This shows that both groups are homogeneous.

Table 2 summarizes the distribution of the problems experienced in sleep habits of patients. Upon looking at the distrubition of the problems in the habit of sleeping, it was reported that 14.3% of the patients in the experimental group could not sleep at all, 22.9% of had difficulty in falling asleep, 37.1% of woke up frequently, 22.9% of had difficulty in waking up, 5.7% woke up with respiratory distress, 20.0% of had slept during the day, 22.9% of had change in sleep time, 11.4% of woke up too early, 5.7% of experienced sleep-related disorders. When experimental and control group patients were compared in terms of the problems experinced in sleep habits, no statistically significant difference was found (p>0.05).

Table 3 illustrates the distribution of causes of deterioration in sleep patterns of the patients. Considering the causes of the deterioration in sleep patterns, it was reported that 2.9% of patients in the experimental group stayed with a lot of people in the same room, 31.4% of had bad physical conditions, 42.9% of had a lot of entry and exit to the room, 22.9% of were in a foreign environment, 31.4% of had disease- related symptoms or pain, 5.7% of had lack of information about diagnosis or applications. Off the patients in the control group, 11.4% of expressed the causes of sleep problems as staying with a lot of people in the same room, 25.7% of having bad physical conditions, 42.9% of having a lot of entry and exit to the room, 34.3% of being in a foreign environment, 40.0% of having disease-related pain or symptoms, 2.9% of having lack of information about the diagnosis or the applications. When the patients of experimental and control group were compared in terms of the deterioration of sleep patterns, no statistically significant difference was found (p>0.05).

Of the patients in the experimental group, it was reported that 82.9% of listen to music before going to sleep, and 91.4% of wants to listen to music before going to sleep. Of the patients who reported that they want to listen to music, 62.9% of preferred listening to Turkish Folk Music, 28.6% of Turkish Art Music, 1.4% of Turkish Classical Music, and 5.7% of pop music. Of the patients in the control group, it was reported that 91.4% of listen to music, and 97.1% of wants to listen to music before going to sleep. Of the patients who report that they want to listen to music, 42.9% of preferred Turkish Folk Music, 40.0% of Turkish Art Music, 14.3% of Pop Music, and 2.9% of Arabesque Music. In terms of the desire of listening to music before going to sleep, no significant difference was found between the groups (p>0.05) (Table 4).

A statistically significant difference was found between the PSQI sub-components of the scores obtained 1st day and at the end of the 4th day

**TABLE 2:** The problems experienced by the patients related to sleep habits.

| | Experimental group | | Control group | | Total * | | |
|---|---|---|---|---|---|---|---|
| **Problems experienced in sleep habits ***** | **n** | **%** | **n** | **%** | **n** | **%** | **Chi-squares test** |
| I can not sleep ever | 5 | 14.3 | 6 | 17.1 | 11 | 15.7 | $X^2$: 0.108, p: 0.743 |
| Difficulty in falling asleep | 8 | 22.9 | 5 | 14.3 | 13 | 18.6 | $X^2$: 0.850, p: 0.356 |
| I often wake up | 13 | 37.1 | 19 | 54.3 | 32 | 45.7 | $X^2$: 2.072, p: 0.150 |
| Having difficulty in waking up | 8 | 22.9 | 9 | 25.7 | 17 | 24.3 | $X^2$: 0.078, p: 0.780 |
| I wake up with respiratory distress | 2 | 5.7 | 2 | 5.7 | 4 | 5.7 | p: 1.000 ** |
| Daytime sleep | 7 | 20.0 | 9 | 25.7 | 16 | 22.9 | $X^2$: 0.324, p: 0.569 |
| I have change in sleep time | 8 | 22.9 | 9 | 25.7 | 17 | 24.3 | $X^2$: 0.078, p: 0.780 |
| I wake up too early | 4 | 11.4 | 6 | 17.1 | 10 | 14.3 | p: 0.734 ** |
| I have sleep-related disorders | 2 | 5.7 | 3 | 8.6 | 5 | 7.1 | p: 1.000 ** |

* Marked more than one option; ** Fisher's exact test was applied; *** Shows the distribution of those who say yes.

**TABLE 3:** The causes of deterioration of sleep patterns of patients.

| | Experimental group | | Control group | | Total * | | |
|---|---|---|---|---|---|---|---|
| **The causes of deterioration of sleep patterns** | **n** | **%** | **n** | **%** | **n** | **%** | **Chi-squares test** |
| Staying with a lot of people in the same room | | | | | | | |
| Yes | 1 | 2.9 | 4 | 11.4 | 5 | 7.1 | p:0,356** |
| No | 34 | 97.1 | 31 | 88.6 | 65 | 92.9 | |
| Staying in a single room | | | | | | | |
| Yes | 0 | 0.0 | 1 | 2.9 | 1 | 1.4 | p: 1.000** |
| No | 35 | 100.0 | 34 | 97.1 | 69 | 98.6 | |
| Physical conditions | | | | | | | |
| Yes | 11 | 31.4 | 9 | 25.7 | 20 | 28.6 | X2:0,280 |
| No | 24 | 68.6 | 26 | 74.3 | 50 | 71.4 | p:0,597 |
| Having a lot of entry and exit to the room | | | | | | | |
| Yes | 15 | 42.9 | 15 | 42.9 | 30 | 42.9 | X2: 0. 000 |
| No | 20 | 57.1 | 20 | 57.1 | 40 | 57.1 | p:1,000 |
| Presence in a foreign environment | | | | | | | |
| Yes | 8 | 22.9 | 12 | 34.3 | 20 | 28.6 | X2:1,120 |
| No | 27 | 77.1 | 23 | 65.7 | 50 | 71.4 | p:0,290 |
| Pain or symptoms associated with the disease | | | | | | | |
| Yes | 11 | 31.4 | 14 | 40.0 | 25 | 35.7 | X2:0.560 |
| No | 24 | 68.6 | 21 | 60.0 | 45 | 64.3 | p: 0.454 |
| Lack of knowledge about diagnosis, and the applications | | | | | | | |
| Yes | 2 | 5.7 | 1 | 2.9 | 3 | 4.3 | p: 1.000 ** |
| No | 33 | 94.3 | 34 | 97.1 | 67 | 95.7 | |

* Marked more than one option; ** Fisher's exact test was applied.

**TABLE 4:** Music listening habits and requests of patients before going to sleep.

| | Experimental group | | Control group | | Total | | |
|---|---|---|---|---|---|---|---|
| **Music listening situations** | **n** | **%** | **n** | **%** | **n** | **%** | **Chi-squares test** |
| Listening to music before going to sleep | | | | | | | |
| Listening | 29 | 82.9 | 32 | 91.4 | 61 | 87.1 | p: 0,477* |
| Not listening | 6 | 17.1 | 3 | 8.6 | 9 | 12.9 | |
| Patients' desire status of listening to music before going to sleep | | | | | | | |
| Wishing | 32 | 91.4 | 34 | 97.1 | 66 | 94.3 | p:0.614 * |
| Not wishing | 3 | 8.6 | 1 | 2.9 | 4 | 5.7 | |
| The preferred type of music** | | | | | | | |
| Turkish Folk Music | 22 | 62.9 | 15 | 42.9 | 37 | 52.9 | |
| Turkish Art Music | 10 | 28.6 | 14 | 40.0 | 24 | 34.3 | |
| Turkish Classical Music | 1 | 1.4 | 0 | 0.0 | 1 | 1.4 | |
| Pop music | 2 | 5.7 | 5 | 14.3 | 7 | 10.0 | |
| Arabesque Music | 0 | 0.0 | 1 | 2.9 | 1 | 1.4 | |

* Fisher's exact test was applied.

** $X^2$ test was not applied. It was shown as a numeric and proportional table

($p<0.05$) (Table 5). All sub-component mean scores of the patients in the experimental group decreased at the end of the 4$^{th}$ day. This situation shows that their sleep quality has increased. No statistically significant difference was found between the PSQI sub-components (except component 7) of the con-

**TABLE 5:** PSQI Sub-Components and Total Mean PSQI Scores of the patients the 1st day and at the end of the 4th day.

| | Experimental group (n:35) | Control group (n:35) | Test[a] | |
|---|---|---|---|---|
| **Properties** | **Mean (SD)** | **Mean (SD)** | **t** | **p** |
| 1st day | | | | |
| Perceived sleep quality | 2.03 (0.30) | 1.91 (0.45) | 1.265 | 0.210 |
| Sleep latency | 2.09 (0.37) | 2.20 (0.53) | -1.041 | 0.302 |
| Sleep duration | 1.49 (0.56) | 1.31 (0.63) | 1.200 | 0.234 |
| Sleep efficiency | 0.34 (0.59) | 0.26(0.61) | 0.597 | 0.553 |
| Sleep disturbance | 2.03 (0.45) | 2.26(0.56) | -1.876 | 0.065 |
| Use of sleep medicationb | 0.00 (0.00) | 0.00(0.00) | - | - |
| Day sleep dysfunction | 1.91 (0.51) | 2.00(0.54) | -0.683 | 0.497 |
| Mean PSQI Scores | 9.80(1.57) | 9.86(1.87) | -0.139 | 0.890 |
| 4th day | | | | |
| Perceived sleep quality | 1.00( 0.00) | 2.03(0.30) | -20.584 | 0.000 |
| Sleep latency | 1.31(0.47) | 2.34(0.54) | -8.499 | 0.000 |
| Sleep duration | 0.94(0.34) | 1.51(0.70) | -4.340 | 0.000 |
| Sleep efficiency | 0.14(0.36) | 0.40(0.55) | -2.315 | 0.024 |
| Sleep disturbance | 1.43(0.65) | 2.40(0.55) | -6.706 | 0.000 |
| Use of sleep medicationb | 0.00(0.00) | 0.00(0.00) | - | - |
| Day sleep dysfunction | 1.14(0.49) | 2.26(0.51) | -9.331 | 0.000 |
| Mean PSQI Scores | 5.97(1.20) | 10.97±1.76 | -13.902 | 0.000 |

[a]Independent-sample t tests were used to assess differences in all variables,

[b]The patients got 0 point as they did not use sleeping pills (inclusion criteria).

trol group 1st day and at the end of the 4th day ($p>0.05$) (Table 5). All sub-component mean score of the patients in the control group increased at the end of the 4th day.

When the groups were compared among themselves, the mean PSQI score of the patients in the experimental group at the end of the 4th day (5.97±1.20) was found to be lower than their mean PSQI score at the 1st day (9.80±1.57). This finding showed that music, which they were listened to end of the 4th day had an effect on the sleep quality of the patients in the experimental group and their sleep quality improved. This finding was found to be statistically significant at an advanced level (t:15.054, p:0.000). The mean PSQI score of the patients in the control group at the end of the 4th day (10.97±1.76) was found to be lower than their mean PSQI score at the 1st day (9.86±1.87). This finding showed that the sleep quality of these patients worsened during their time of hospital stay. This finding was found to be statistically significant (t:-3.640, p:0.001) (Table 5).

A statistically significant difference was found between the systolic and diastolic blood pressures, pulse rates and breathing rates, measured in the 0. and 30. minutes, of the patients in the experimental group in the 1st, 2nd, 3rd and 4th days ($p<0.05$). The systolic and diastolic blood pressures, pulse rates and breathing rates decreased for 4 days in the 30. minute after the patients were listened to music (Table 6). No statistically significant difference was found between the systolic and diastolic blood pressures, pulse rates and breathing rates, measured in the 0. and 30. minutes, of the patients in the conrol group in the 1st, 2nd, 3rd and 4th days ($p>0.05$) (Table 6).

During the four days, the music that was listened to experiment group became effective and at the end of the fourth day, this event influenced the vital signs of patients in the experimental group positively.

## DISCUSSION

Sleep problems and the deviations in the vital signs of the hemodialysis patients with chronic renal

**TABLE 6:** Systolic, diastolic blood pressure and pulse rate, respiration rate values of the patients according to the days in the 0. (before being listened to music) and 30th (after being listened to the music).

| Outcome measures | Experimental group Mean (SD) | Control group Mean (SD) | Outcome measures | Experimental group Mean (SD) | Control group Mean (SD) |
|---|---|---|---|---|---|
| **SBP** | | | **PR** | | |
| 1st days | | | 1st days | | |
| 0.minute | 140.57 (17.66) | 137.71 (16.46) | 0.minute | 85.54 (11.68) | 85.77 (6.98) |
| 30.minute | 130.97 (18.17) | 138.00 (16.05) | 30.minute | 80.66 (10.80) | 85.89 (7.03) |
| p-value[a] | 0.000 | 0.324 | p-value[a] | 0.002 | 0.422 |
| 2nd days | | | 2nd days | | |
| 0.minute | 135.43 (16.15) | 136.00 (13.55) | 0.minute | 85.14 (11.70) | 85.94 (7.58) |
| 30.minute | 131.43 (14.78) | 136.00 (13.76) | 30.minute | 82.29 (11.19) | 85.86 (7.96) |
| p-value[a] | 0.000 | 1.000 | p-value[a] | 0.001 | 0.609 |
| 3rd days | | | 3rd days | | |
| 0.minute | 132.86 (16.00) | 138.29 (15.62) | 0.minute | 82.97 (12.09) | 85.49 (7.22) |
| 30.minute | 128.86 (15.68) | 138.29 (15.62) | 30.minute | 79.66 (10.18) | 85.54 (7.42) |
| p-value[a] | 0.000 | - | p-value[a] | 0.008 | 0.661 |
| 4th days | | | 4th days | | |
| 0.minute | 133.34 (17.21) | 140.57 (15.70) | 0.minute | 81.45 (10.64) | 86.29 (7.94) |
| 30.minute | 124.74 (18.44) | 140.86 (15.79) | 30.minute | 77.49 (7.85) | 86.57 (8.17) |
| p-value[a] | 0.000 | 0.324 | p-value[a] | 0.017 | 0.058 |
| **DBP** | | | **RR** | | |
| 1st days | | | 1st days | | |
| 0.minute | 83.09 (14.11) | 85.71 (10.92) | 0.minute | 20.23 (1.91) | 19.71 (1.95) |
| 30.minute | 75.60 (14.71) | 86.29 (11.90) | 30.minute | 18.80 (1.78) | 19.80 (1.97) |
| p-value[a] | 0.000 | 0.324 | p-value[a] | 0.000 | 0.183 |
| 2nd days | | | 2nd days | | |
| 0.minute | 79.71 (11.75) | 85.14 (11.73) | 0.minute | 19.29 (1.67) | 19.57 (2.38) |
| 30.minute | 73.14 (11.94) | 84.86 (12.92) | 30.minute | 18.37 (1.50) | 19.51 (2.43) |
| p-value[a] | 0.000 | 0.711 | p-value[a] | 0.000 | 0.160 |
| 3rd days | | | 3rd days | | |
| 0.minute | 79.43 (12.59) | 83.71 (12.15) | 0.minute | 19.00 (1.48) | 19.71 (2.23) |
| 30.minute | 72.86 (13.84) | 84.29 (12.67) | 30.minute | 18.17 (1.58) | 19.91 (2.28) |
| p-value[a] | 0.000 | 0.160 | p-value[a] | 0.000 | 0.109 |
| 4th days | | | 4th days | | |
| 0.minute | 78.26 (13.57) | 84.86 (12.45) | 0.minute | 18.74 (1.44) | 19.94 (2.35) |
| 30.minute | 70.31 (12.25) | 84.57 (12.45) | 30.minute | 17.94 (1.45) | 20.00 (2.38) |
| p-value[a] | 0.000 | 0.661 | p-value[a] | 0.000 | 0.571 |

[a]: Paired-sample t tests were applied for the assessment of the difference between the vital signs detected in the 0. and 30th minute.

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; PR: Pulse rate; RR: Respiration Rate.

failure affect their quality of life a lot. Music is known to be decreasing the activities of the neuroendocrine system and symphathetic nervous system. Decreased neuroendocrine activity reduces the release of corticotropin (adrenocorticotropin, ACTH) and the stress response. Reduction in sympathetic activity; reduces the blood pressure, heart rate, breathing rate and it creates the feeling of relaxation. For this reason, music theraphy may be an effective intervention in increasing the sleep quality and decreasing the vital signs. The results of this study also supports this finding.

As a result of the review of literature, no study was found including a seperate evaluation and com-

parison of the effect of music theraphy on the sleep and vital signs of the experimental and control group patients who are getting hemodialysis treatment. For this reason, the discussion was made with the inspiration of different groups of samples.

In the study of Lai & Good which examined the effect of music on sleep quality, individuals were listened to music for 45 minutes before they go to sleep for a period of 3 weeks. No statistically significant difference was found in the sleep quality of the experimental and control groups before they were listened to music. However, significant differences were found in favor of the experimental group after the music was played.[29] This finding is supportive of the result of this study (Table 5).

Chan et al. found a statistically significant difference between the mean PSQI mean scores obtained at the end of the 1st week (7.6 ± 4.0) and the 4th week (5.1±2.6) for the individuals in the experimental group in their study made with the elderly individuals who were listened to music for 4 weeks ($X^2$:27.761, p<0.001).[30] No statistically significant difference was found between the mean PSQI mean scores obtained at the end of the 1st week (6.1±3.7) and the 4th week (6.0 ±3.6) for the individuals in the control group ($X^2$:4.091, p:0.252).[30] This finding is parallel to the result of our research (Table 5). Music was expected to increase the quality of sleep according to the reviewed literature knowledge and it is also supportive of the research hypothesis.

In many studies, as a result of music theraphy; systolic and diastolic blood pressure , pulse rate and breathing rate values have dropped.[31-35] In the study made by Chlan et al., as a result of the music theraphy which was applied to the patients; it was determined that there was a decrease in the systolic blood pressure values of the patients, and there was a statistically significant difference between the systolic blood pressure values of the patients in the application group (p<0.05).[36] In the study made by Lee et al., the decrease in the systolic and diastolic blood pressure values of the patients in the experimental group was found to be statistically significant.[21] In the study made by Ikionomidou et al., the decrease in the pulse and breathing rate of the patients in the experimental group was found to be statistically significant.[34] Findings of our study (Table 6) are parallel to the results of this study. Music theraphy was determined to be decreasing the systolic and diastolic blood pressure, pulse rate and breathing rate values. In this aspect, it can be said that music theraphy is an intervention which may be used in decreasing systolic and diastolic blood pressure, pulse rate and breathing rate values. The results can be explained by the psychophysiological theory that sleep quality and vital sings can be improved by relaxing the body with sedative music which decreases circulating noradrenaline that is related to sleep onset.[20] In early nursing history, Florance Nightingale used music as a nursing intervention. As an effective and non-pharmacological therapeutic modality, music can assist nurses in creating a healing environment that promotes physical, emotional and spiritual well-being.[20]

### LIMITATIONS

This study has several limitations. Firstly, due to the fact that there is only one university hospital in the city of Malatya, this study was only limited to this hospital. Secondly, the participants of the study did not listen to their choice of music, instead, they listened to the music chosen by the researcher (Turkish Art Music). Thirdly, there were several difficulties due to the fact that the research was made by a single researcher. The limitation of music to 30 minutes and the sleep quality's not being verified with the polysomnography were other limitations.

The studies which will possibly be made in the future should be studies which assess the effects of different types of music, have a longer music listening time and evaluate the sleep quality with polysomnography.

## CONCLUSION

In conclusion, music theraphy has a positive effect on the sleep quality and vital signs of the patients with CRF. Music theraphy is a non-invasive, creative and efficient intervention with no known side effects which can be used on the patients with chronic renal failure. Nurses should include the

music theraphy in the routine care of the patients with CRF. Nephrology nurses should do the sleep assessment as well as the routine assessment of vital signs and they should take music therapy into the nursing care plans as a nursing initiative.

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