

EFFECT OF PREFERRED MUSIC ON UREMIC PRURITUS IN HEMODIALYSIS PATIENTS

Fatemeh Asadollahi¹, Jaleh Mohammad Aliha², Daryadokht Masror Roudsari³
Narges Asadollahi⁴

1. MSc student of nursing, Iran University of Medical Sciences and Health Services, Faculty of nursing and midwifery

2. Faculty member of critical care department Iran University of Medical Sciences, Tehran, Iran

3. Faculty member of medical surgical nursing department Iran University of Medical Sciences, Tehran, Iran

4. Msc of Mathematical Statistics, Statistics Supervisor University of Birjand, Iran

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ABSTRACT

Background and purpose: Pruritus is one of the most common difficulties of patients of final stage renal failure under hemodialysis. It has some symptoms that affect the quality of life of patients suffering renal failure. However, the common treatments for solving this difficulty have not been very effective. One recent treatment for uremic pruritus is the use of complementary therapies. So the aim of this study is to examine the influence of preferential music on the pruritus of patients under hemodialysis.

Method of study: This study was half-experimental with the convenience sampling with pre- and posttest and control group conducted on 84 patients referring to hemodialysis department of specific diseases center of Birjand University of Medical Sciences. In the test group the music therapy was used during hemodialysis for 30 minutes. The data were collected by a questionnaire consisting of demographic information of participating patients, a five-dimensional questionnaire before beginning intervention and eyesight indicator before and 15 minutes after music therapy. Then the data were evaluated by using descriptive and analytical statistical methods and SPSS version 21 software.

Findings: The results showed that the mean pruritus before and after the intervention in two control and test groups was respectively, 5.33 ± 2.275 , 5.2 ± 21.739 , 5.2 ± 31.268 and 1 ± 2.711 . Analysis of data showed that music therapy reduced the pruritus.

Conclusion: Music therapy can reduce significantly the pruritus in patients under hemodialysis.

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Introduction

Pruritus is one of the common and annoying difficulties of patients with advanced kidney failure (1). The uremic pruritus appears in patients usually before starting treatment with hemodialysis and progresses (2); the times and intensity of pruritus increase significantly with the progress of the disease and increase in the duration of therapy (3). The prevalence of pruritus has been reported among sufferers of chronic kidney failure by 10-70% (4), in patients under hemodialysis by 50-90% (Narita et al, 2008). By improving the quality of dialysis, its prevalence has fallen in recent decade. In one of the greatest trials (The Dialysis Outcomes and Practice Patterns Study) 42% of patients under dialysis have experienced pruritus (5). Cause of pruritus in patients with chronic renal failure is unknown and in this regard some hypotheses have been proposed. Among some causes of pruritus in these patients can be named the release of histamine, uremic skin (dry and atrophy skin),

Corresponding Author: Fatemeh Asadollahi, MSc student of nursing, Iran University of Medical Sciences and Health Services, Faculty of nursing and midwifery.

reproducing the hair erecting muscles, atrophy of sebaceous glands cells and sweat of skin, secondary hyperparathyroid, PH of skin, disorders of two-capacity ions (accumulation of calcium, magnesium and phosphorus in the skin), uremic toxins, serotonin, opioids, mast cells, Hypervitaminosis A, iron deficiency anemia, peripheral Neuropathies, allergies, accumulation of bile acids and increase in sensitivity to hemodialysis (6).

Another theory in the field of uremic pruritus is the theory of pain intensity; according to this theory the low level activity of pain receptors causes the sense of pruritus, while their high activity creates the sense of pain (7.8). The neurophysiological studies have confirmed the extremely delicate and sensitive free nerve terminals with high speed and adaptation that transfer only the sense of tickling and pruritus on the skin. In addition, these terminals have been found especially almost in superficial skin layers which are only transferring texture of tickled and pruritus senses. These senses are transferred by very small fibers of type C without myelin; they are similar to those fibers that transfer the pain of slow formation type (9).

Pruritus is a subjective, unpleasant and annoying complaint and can cause the patient's anxiety due to disturbing comfort and convenience (10, et al A Shariati. S., 2010, 12); and on the other hand it endangers the physical and mental ability and quality of sleep and causes the disorder in the everyday activities of life and disturbance in mood and a negative impact on the social mental state (16-13); thus it causes disorder in the patient's quality of life and even in some studies the death caused by pruritus has been reported (16). The uremic pruritus creates the frustrating conditions for the patient and health carers, because there is no definitive therapy that is effective in its lessening (17).

According to the different causes of pruritus in hemodialysis patients, so far several treatments have been used and examined including venous injection of lidocaine or heparin, comestible prescription of cholestyramine, Gabapentin (it operates with impact on gamma-aminobutyric acid system that is a regulating nerve mediator of sense of pain and due to neurophysiological mechanism similar to pruritus and pain it has been used experimentally in studies of clinical trials to reduce the pruritus that have positive effects in reducing the pruritus), thalidomide, ondansetron, naltrexone, erythropoietin, Sertraline, phosphorous bonding, methadone, Antihistamines, skin moisturizer, topical tacrolimus, parathyroid and ultraviolet ray treatments, but the treatments are mainly experimental with the uncertain effectiveness and side effects (-20 18),

Music therapy is proposed as one of the methods of complementary medicine. Because the human being has used always music to express their thoughts and feelings. Music is one of the simplest and most general distraction methods which play commensurate with the spirit of the individual a calming and stimulating role. Music helps to reduce the pain and anxiety through distraction from negative stimuli to the delightful and encouraging things and leads patient to move away uncomfortable thoughts through the occupation of mind with something familiar (21). Music is a safe, cheap, simple and non-aggressive tool, without any side effect that the nurse can perform independently alongside other nursing care (22), (23). In the past two decades, the use of music as a method approved in nursing care has been significantly increased (24). Research results have shown that music causes to reduce anxiety and pain in a variety of chronic and advanced diseases (25.26), improve mood (27) and promote the quality of life (28). Different studies in the field of music as a method of care in patients under hemodialysis have shown that they help to improve emotional experience (29), reduce the fluctuation of blood pressure (30), decrease anxiety and depression (31), improve the sense of well-being (32), perceptual stress reduction (33) and increase the reliability of the duration of the hemodialysis in patients during hemodialysis (34).

Due to the mechanism similar to uremic pruritus and theory of pain, the treatments that affect pain can also be effective in removing chronic pruritus (35). Other possible reasons for the influence of music can be the powerful mental processes with the aim of creating concentration; the music is able to reduce the transfer of pain signals in the spinal cord. Also the provided stimulus (surely music) can compete with other peripheral neural impulses, so that the stimulus transfers through the posterior nucleus of spinal cord to the central nervous system and the brain concentration moves from the receiver resulting in pain to stimulus and consequently the pain is relieved. Also, based on the theory of gate control the music enables the sensory fibers type 2 and leads to irritation between the neurons that inhibit pain signal transmission to the brain; so the gate can be closed significantly and the patient enjoys from reducing pain or being neutralized of feeling pain (16). In addition, the music helps to increase level of endorphins and strengthen the imagination and distraction from the pain and with the joy of hearing music it reduces pain perception (36). Research results have shown that hearing favorite music causes muscle relaxation, distraction from pain, reduction of intensity of pain and reduction of sending pain messages to the central nervous system (37).

The systematic review of Cole and LoBiondo-Wood (2014) has specified the positive impact of music on reducing the pain and other symptoms in hospitalized adult patients and has recommended the use of music as an complementary treatment in reducing pain, anxiety, muscle tension, heart rate and blood pressure; however they recommended doing more studies to determine the impact of music on non-surgical patients' pain reduction during painful procedures and the less need to sedative drug use in music and in addition in order to determine the optimal dose and duration of required music intervention (37).

A study of Burrai et al. (2014) on the impact of performing live saxophone music by the nurse on the pruritus, anxiety and pain of patients under hemodialysis indicated that this type of music is of effect on these three variables and the researcher announced that the better interaction between the nurse and a patient caused by a type of intervention has been probably effective in reducing pruritus, anxiety and pain (16). Music therapy as a component of an effective and low cost non-

pharmaceutical and supplementary treatments can be used in the treatment of diseases and their unpleasant side effects, in the education of nurses and patients as well as health management to reduce costs and optimize the treatment and do clinical trials in the field of nursing. This is while, according to conducted studies, the limited scientific researches have been done to record and validate the influence of music on pruritus of patients under hemodialysis; therefore, with regard to the important role of the nurse in the care of these patients and creating their comfort and convenience, the study of the influence of music on pruritus of patients under hemodialysis was done in Center for Specific Diseases of Birjand University of Medical Sciences.

Method of study

This research was a half-experimental study of non-randomized clinical trial with the control group; its research population was all patients referring to the dialysis departments under cover of Birjand University of Medical Sciences; the sampling was done by the convenience method and according to the inclusion criteria for the study including over 18 years age for all patients, more than three months of hemodialysis, cognitive and auditory healthy power, non-use of the devices for hearing, intensity of pruritus more than 3 with VAS scale, lack of history of pruritus-causing skin diseases and drug sensitivity; the criteria for withdrawal of study: having pruritus with non-uremic origin (with a physician expert) and the patient's unwillingness in participation in the study. For the allocation of research units in the two control (42 people) and intervention (42 people) groups one hour after the start of hemodialysis, the pruritus level of all patients was determined by VAS pruritus scale and the patients with conditions of entry into the study were selected and with their willingness to participate in the study a consent form was completed consciously by them; the two control and intervention groups were randomly selected based on the intensity of pruritus and the preferential music package which includes a traditional, classic and gentle music without words was given to the intervention group patients. Data collection tool in this study included a three-part questionnaire consisting of a demographic questionnaire (containing 8 questions in the areas of age, sex, marital status, education, underlying disease, duration of dialysis, number and duration of sessions of dialysis), five-dimensional pruritus questionnaire (5D) (Duration of itch, Degree, Direction, Distribution, Disability) (containing questions related to the duration of pruritus, pruritus intensity, pruritus clinical course, intensity of impact of pruritus on everyday activities and location of itch) and Visual Analog Scale. The five-dimensional scoring of pruritus for first 4 dimensions is between 5 (without pruritus) and 25 (maximum amount of pruritus) and scoring measurement scale of vision is zero to ten; without pruritus (0 cm), slight pruritus (0.1 up to 2.9 cm), mean pruritus (3 to 6.9 cm), intense pruritus (7 to 0.9 cm), very intense pruritus (9 to 10 cm). The five-dimensional pruritus questionnaire has been introduced by Elman et al in 2010. This tool has convergent validity, internal agreement, reliability and good sensitivity compared to the intensity of pruritus. Elman et al were used this questionnaire in a study with 234 samples to examine the pruritus of samples with chronic pruritus of liver diseases (63 cases), kidney disease (36 people), skin disorders (56 people), AIDS (28 people) and patients with burns (51 people). The result of study showed it was associated highly with VAS; the convergent validity ($r = 0.727$) and reliability of tool was conducted through the questionnaire repeat method of the first and third day, its agreement coefficient was equal to 0.96. So the result of the above study showed that employing this tool to check the intensity of pruritus is useful in clinical studies.

The intensity of pruritus was evaluated using VAS pruritus scale and pruritus questionnaire in both experimental and control groups and fifteen minutes later a softly music without words was played in intervention group for 30 minutes through the headphones and Sony Player WM-EX190. For group control, the headphones were laid without music and they rested. The pruritus scale VAS was evaluated 15 minutes after the intervention in both groups. The data were calculated and compared in the primary regulation table and using descriptive and inferential statistical methods by SPSS version 21.

Findings

The results related to the demographic data of the patients participating in the study showed that 50.8% of participants were female and 49.2% males; most of participants in the study were in 60-79 years old (44.2%) and married (84.2%) and uneducated (39.2%). In terms of underlying diseases 24.2% of participants were suffered from diabetes, 24.2% from hypertension, 17.5% had both symptoms and 14.2% had other underlying diseases (such as kidney cysts, kidney stones, Glomerulonephritis), while 20% of the participants were not of any underlying disease. Most of the patients participating in the study were under dialysis for 1 to 5 years (69.2) with the number of sessions of 49.2% less than 3 times in a week for 3 to 4 hours (96.7%) and 71.7% of them experienced pruritus at the time of study.

Based on the Chi-square test between test there is no significant difference between the two test and control groups in terms of gender ($P = 0/828$) and marital status ($P = 1/000$), the underlying disease ($P = 0/405$), the number of hemodialysis sessions ($P = 0/126$), the duration of hemodialysis sessions ($P = 0/368$) and length of pruritus in a day ($P = 0/645$); these two groups are statistically homogeneous. Mann-Whitney test result indicates the equality of average assumption of education ($P = 0/789$), age ($P = 0/181$), duration of hemodialysis ($P = 0/260$), the average intensity of pruritus in two weeks ($P = 0/711$), clinical course of alleviating pruritus ($P = 0/087$), the intensity of impact of pruritus on the everyday activities ($P = 0/990$), pruritus location ($P = 0/713$), the intensity of pruritus of 30 minutes after starting dialysis ($P = 0/852$) in two test and control groups; there is no significant difference between the two groups.

Table 1: frequency distribution of information of patients under study regarding demographic characteristics of research units

Percentage		Number	Variable
50.8	61	Woman	Gender
49.2	59	Man	
20.8	25	20-39	Age
34.2	41	40-59	
44.2	53	60-79	
0.8	1	80 & higher	
11.7	14	Single	Marital status
84.2	101	Married	
4.2	5	Demised spouse	
39.2	47	Illiterate	Education level
23.3	28	Elementary	
13.3	16	In junior high school	
17.5	21	Diploma	
5.8	7	An academic	
24.2	29	Diabetes	Underlying disease
24.2	29	High blood pressure	
17.5	21	Diabetes and High blood pressure	
14.2	17	Other	
20	24	Non	
12.5	15	Less than 1 year	Dialysis time
69.2	83	1 to 5 years	
18.3	22	More than 5 years	
49.2	59	Less than 3 times	Number of dialysis sessions in week
47.5	57	3 to 4 times	
3.3	4	More than 4 times	
0.8	1	Less than 3 hours	Duration of any session
96.7	116	3 to 4 hours	
2.5	3	More than 4 hours	
71.7	86	Yes	Pruritus at present
28.3	34	No	

Table 2: comparison of intensity of uremic pruritus after intervention in two test and control groups

group	Mean±standard deviation
control	5/21±2/739
intervention	2±1/711
Mann-Whitney test	P value= 0/000

The results of table 2 show there is a significant difference after the intervention between test and control groups in terms of the intensity of pruritus (P = 0/000).

Table 3: intensity of pruritus before and after intervention in two test and control groups

Wilcoxon signed-rank test	After intervention	Before intervention	
	Mean±standard deviation	Mean±standard deviation	
P = 0/504	5/2±21/739	5/33±2/275	Control
P = 0/000	1±2/711	5/2±31/268	test

The results of table 3 show that for the control group before and after intervention (laying headphones without playing music) ($P = 0.504$) the assumption of the equality of average score will be accepted, but for the test group before and after intervention ($P = 0.000$) the equality of the average intensity of pruritus is rejected, in the sense that after the intervention and playing music the intensity of pruritus shows significant difference with that before the intervention.

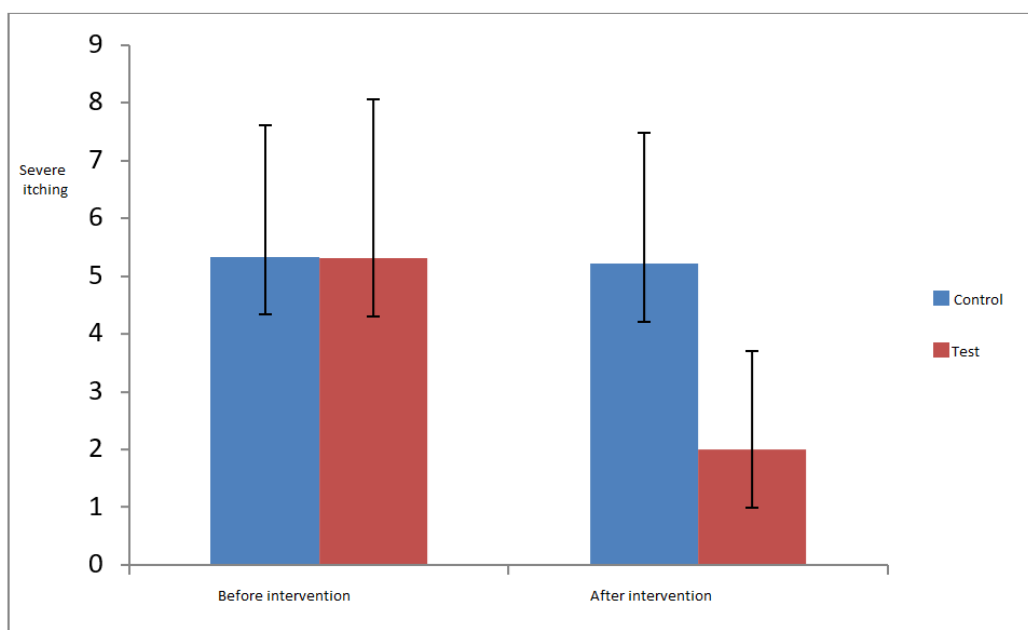


Diagram 1: comparison of the average intensity of pruritus before and after intervention in two control and test groups

Diagram 1 shows that the average intensity of pruritus in the test group has been reduced about 62 percent after the intervention (-3.31).

Discussion And Conclusion

Examining the results of table 2 indicated that the obtained average score after intervention was in the control group 5.21 ± 2.739 and in the intervention group 1 ± 2.711 ; there is a significant difference between the test and control groups in terms of the intensity of pruritus after intervention (significant levels: $P = 0.01$, $P < 0/000$). This represents that the music has had a positive impact on the recovery of intensity of pruritus in patients under hemodialysis.

Examining the results of table 3 indicated that the average score of pruritus before and after intervention was in the control group 5.33 ± 2.275 and 5.21 ± 2.739 , respectively. This result is predictable due to the lack of intervention in this group, while in the intervention group with music the mean score of pruritus before and after the intervention was equal 5.31 ± 2.268 , 2 ± 1.711 ; it represents a 60% reduction in the average score of the pruritus after intervention. The results of statistical tests also indicated that in the test group before and after intervention ($P = 0/000$) the equality of average intensity of pruritus is rejected. This means that after the intervention and playing music the intensity of pruritus is significantly of difference before the intervention; it indicates the influence of music on the intensity of pruritus. Generally, on the basis of obtained results we can say the use of preferential music as a method of complementary medicine in improving uremic pruritus of patients under hemodialysis helps to better the quality of life and create the comfort and convenience of these patients. So one of the strengths of this study is to achieve an effective therapy in controlling uremic patients' pruritus.

The result of the study of Lin et al (2012) with the aim of impact of music therapy as a complementary treatment in good condition of the elderly patients under hemodialysis was also consistent with the results of the present study. The result of above research represented that hearing music during hemodialysis led to patients' increased feeling of well-being and comfort. It can be said that despite the fact that the aforementioned study has not dealt with the impact of music on the pruritus, its relaxing effect and increase of comfort can reduce pain and even pruritus.(32)

The result of our study was similar with the research of Burai et al (2014) that have studied the impact of the live saxophone music on pruritus, anxiety and pain of patients under hemodialysis. The results of study showed that the live saxophone music influenced all three variables and caused to reduce pruritus (76%), anxiety and pain.(16)

Due to the same mechanism of uremic pruritus and theory of pain intensity, the treatments affecting pain can also be effective in removing chronic pruritus (38).

In a study that Huang et al. (2010) conducted on patients with cancer, the findings indicated that the intervention group had less pain intensity compared with the control group and based on a score obtained for the test group, they had less pain intensity on the average by 1.5 scores after the intervention (39).

Also, a semi-empirical study was conducted by Ozer et al (2013) in Turkey entitled "effect of music therapy on the physiological criteria and intensity of pain reported by patients after open heart surgery" (40). The results of this study showed a significant increase in oxygen saturation in arterial blood ($P = 0.001$) and a significant decrease in pain intensity ($P = 0.001$) of test group patients. The results of mentioned studies confirm the impact of music on pain relief for vigilant patients.

In some cases, some conflicting results has been reported in relation to the impact of music on pain. For instance, in a research that Besel (2006) conducted on patients under mechanical ventilation, the results showed there is no difference between patients' score of pain before and after listening to music (18). Perhaps the cause of this difference is a difference in research population and pain measurement scale type; on the other hand, in his study to measure the pain he used a graphical measurement tool for pain that also can make difference in the results.

Also in an experimental study (2010) provided by Phips, Carole et al entitled the influence of music therapy on anxiety and pain of patients of the Interior and the nerves surgery departments, 53 patients who had their age range between 22-96 years, were studied. In this study, the intervention group was 24 people and the control group 29 people. For the intervention group was playing music for 30 minutes. Then immediately before and after the intervention the blood pressure, heart rate, respiratory rate, temperature, pain and anxiety patients were measured and recorded. The results of study showed there was a statistical significant difference after doing intervention in number of breathing and heart rate in the music therapy group. However, there was not observed statistically any significant difference in the case of high blood pressure, pain and temperature. The results of this study as well are not consistent with the results of the present study. The difference can be because of times of playing music, kind of music, the patient's conditions and environment conditions governing study.

Also, Walworth and Rumana (2008) conducted a study on 27 patients hospitalized in nerves surgery department (intervention group=14 people and the control group = 13). The intervention group patients listened 20-30 minutes of live music; in this study the anxiety and pain, mood, perception of hospitalization or procedures, relaxation and stress were measured. The amount of receiving sedative (morphine) was similar in all patients after surgery (41). Patients' Nausea intensity, time of staying in the hospital from the time of admission to the time of clearance were evaluated. The results of this study did not show any significant difference in mood, anxiety, pain score, the use of anti-nausea and vomiting, analgesics and the effect on the duration of hospitalization. The results of this study is not consistent with the results of the present study; it could be due to differences in the methods of working, the times of playing music and research population.

In a research which Abdi et al (2016) conducted to evaluate the impact of the preferential music on the quality of sleep and pain intensity of patients suffering from burn (42). The results showed that the quality of sleep ($P < 0.991$) and pain intensity ($P = 0.046$) of patients in the intervention group was significantly improved after listening to music. Also, after the intervention the two intervention and control groups had significant differences in terms of mean sleep quality score ($P < 0.001$) and pain intensity ($P = 0.046$); it was consistent with the results of our study.

In the research of Najafi Ghezaljeheh et al (2016) in order to investigate the influence of music and massage on pain, anxiety and relaxation of burn patients, 240 burn patients in Tehran's Motahari hospital were put on randomly 4 groups from September 2013 to May 2015 (43). The control group (60) received the routine primary care. The music group (60) listened favorite songs. Massage Group (60) received Swedish massage and group of music and massage (60) a combination of Swedish massage and favorite songs for 20 minutes once a day and three consecutive days. The results showed that music and massage and a combination of both were of impact on reducing the pain and intensity of anxiety and an increase in the level of relaxation; they were consistent with the results of our study.

Also it should be noted that the results of researches of Hsu et al (2016) in order to investigate the influence of music on pain and anxiety in burn patients during replacement of dressing and those of Alparslan et al (2015) for examining the influence of music on pain of patients with fibromyalgia were also consistent with the present study(44).

Due to the mentioned contents and the findings of this study, the use of music therapy is recommended in patients under hemodialysis in terms of reducing the level of uremic pruritus and subsequently its influence on optimizing quality of health services offered by health staff, especially nurses.

Appreciation

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