


# Effects of Music Intervention on Patients Undergoing Hemodialysis in the Bangkok Metropolitan Administration Hospitals

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## Abstract

This research focused on the use of music interventions in 54 patients receiving hemodialysis treatments at the Bangkok Metropolitan Administration hospitals. The purpose of this study was to compare the effects of live music or music listening interventions on pre- and postmeasures of patients' blood pressure, pulse rate, pain, and anxiety. The results showed significant improvements in blood pressure and pulse rate and statistically significant reductions in pain and anxiety for patients in both music interventions ( $P < .05$ ). There were no significant differences in these effects between live music intervention and music listening. Both kinds of music interventions were found to significantly reduce the rate of perceived pain and anxiety. It can be summarized that both types of music interventions can be used according to patients' need and necessity, and concern of budget, personnel, and facility within each hospital are taken into consideration.

## Keywords

effect of music, music intervention, music for hemodialysis

## Rationale

Music is reflective and represents human society's distinct way of life. Individuals compose music from their imagination, seeking to portray feelings with sounds depicted through notes in rhythms. Whether they are long or short or blended with tones that are high or low, such choices are expressions of personal creativity. Music is infused and intertwined with a way of life and carried on through generations.<sup>1</sup>

Humankind has utilized and enjoyed music for reasons other than its support of traditional rituals and entertainment. Music can also be used to address physical and mental conditions, and the field of music medicine has evolved in many countries around the world. For instance, there are a variety of studies that explore of the effects of music therapy interventions on a variety of applications for stress and pain.

An early study involved music listening strategies for women in labor and delivery; another study tests the impact of 8 music listening strategies on depression, anxiety, self-esteem, and mood in clinically depressed older adults; and the third utilizes a more active music therapy intervention, including music listening, improvisation/active music making, and songwriting, for women who have metastatic breast cancer. The results of such studies lend support to the use of easily

accessible music strategies in a variety of clinical settings. Applying music therapy-based coping techniques for everyday stress and chronic conditions shows strong positive implications.<sup>2</sup>

In Thailand, the field of music medicine remains underdeveloped due to the lack of essential broad governmental support

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in educational programs, leading to professional certification. In Thailand's urban areas such as Bangkok, which is highly polluted and has a highly competitive work environment, people experience stress-related physical and mental disorders that increasingly burden the resources of government hospitals.<sup>3</sup> Many patients in the urban hospitals also have stress and anxiety. This pilot research project involved utilizing the therapeutic use of music as a complementary approach to reduce pain and anxiety in patients undergoing hemodialysis. This research aims to incorporate an interdisciplinary (ie, psychology, behavioral science, and ethnomusicology) and holistic approach in the therapeutic utilization of music for patients undergoing dialysis. The study was conducted by a team of experts in accordance with field-accepted research regulations and epidemiology and biostatistics guidelines with the objective of examining the therapeutic use of music as a potential treatment methodology. A review of the contemporary work in this area reveals only 2 similar studies. The first study is "The Effect of Music Therapy on Anxiety and Depression in Patients Undergoing Hemodialysis."<sup>4</sup> The results of this study suggest that music therapy may be applied as a method of nursing intervention contributing to the improvement of quality life by reducing the anxiety and depression in patients undergoing hemodialysis. The second similar research project involved the collaboration between Greek and German researchers titled "An Investigation of the Effects of Music on Anxiety and Pain Perception in Patients Undergoing Hemodialysis Treatment."<sup>5</sup> The results showed that listening to preferred music led to reduced anxiety and pain in patients undergoing hemodialysis.

## Research Objectives

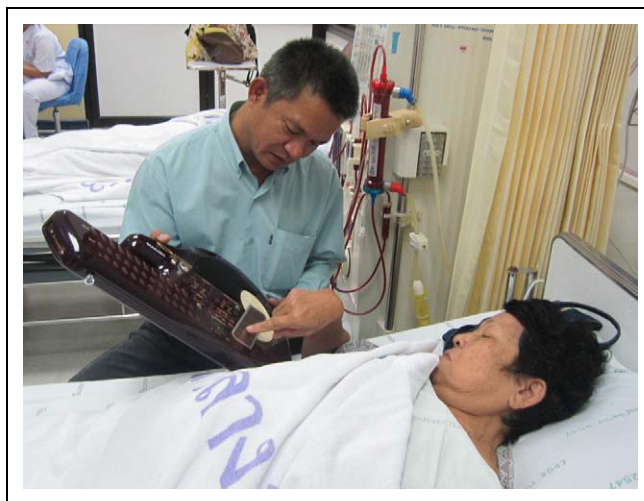
This study compared the effect of live music intervention and music listening on patients with chronic renal failure undergoing hemodialysis in 3 Bangkok metropolitan hospitals—Charoenkrung Pracharak, Klang, and Taksin.

## Materials and Methods

This research utilized a crossover, pre- and posttest design with a treatment group of 54 hemodialysis patients. The initial type of treatment, that is, "live" or "listening," was randomly assigned. Each intervention took 20 minutes, and the wash-out period was 1 week. The music interventions were led by a music therapist from the Thai Red Cross's Sawangkanivas Rehabilitation Center. All of the study patients receiving hemodialysis were from the 3 hospitals and met the inclusion criteria. All participants were willing to participate and signed the informed consent form approved by the ethics committees of Bangkok Metropolitan Administration.

### Inclusion and Exclusion Criteria

Participants were included in the study if they were outpatients undergoing hemodialysis treatment, were between 18 and 70



**Figure 1.** A participant touching Q-Chord in the live music intervention.

years old, had adequate hearing (ie, possessed the ability to hear music within an acceptable range), and were able to care for themselves. Participants were excluded from the study if they had abnormalities in either their pulse rate or their blood pressure, were unable to follow the guiding instructions, lacked the ability to communicate to provide feedback during the study, were medically unstable, and/or had hearing disorders.

### Tools Used in the 2 Music Interventions

A portable synthesizer (Q-chord model QC-1; Suzuki Music USA, Santee, California) and a notebook computer were used during the live music intervention. The Q-chord features multiple interactive features such as a proximity and motion detector area that works like guitar strumming as well as piano-like keys that allows the patient to participate in the music creation and/or sing along. An MP3 player and headphones were used during the music listening intervention. Patients were asked to select their preferred music during both forms of intervention. Afterward, their levels of pain and anxiety were assessed, and blood pressure and pulse rate data were collected using electronic monitors (Figure 1).

Tools that were used to measure the patients' pain and anxiety were recorded via self-reports on numeric rating scales, and their blood pressure and pulse rate were recorded by automatic blood pressure and digital pulse rate monitors, respectively.

### Musical Interventions

The 15-minute musical intervention process was divided into 3 stages. Both the live music and music listening interventions began with a 5-minute breathing exercise, followed by either a live music or music listening activity for 7 minutes, and concluded with a 3-minute oral feedback summary evaluation by the patient.

**Breathing Exercise (5 minutes).** The patient practiced inhaling and exhaling in time with the tempo of the music played by music therapist. Afterward the patient participated in either the live or music listening activity. The music used during the breathing exercise was an improvised melody played by the therapist on the Suzuki Q-chord to first match and then reduce the patient's respiratory rate.

**Listening Musical Intervention (7 minutes).** The music used in the music listening intervention was chosen by each patient in advance, according to their preference. Upon analysis, the patient-selected music was divided into 5 musical categories: Thai country songs (Luk thung), Thai urban songs (Luk Krung), Music for life (Plang Pheor Chevit—music that aims to encourage the human spirit to stay strong and/or conveys an understanding of the nature of human life), Thai traditional music, and lastly English pop songs (see the Appendix).

**Process.** The music therapist prepared each patient's selection of music on an MP3 player, which was played using a headset. The patient's preferred recordings were brought into the intervention session and used during the hemodialysis period for 7 minutes.

**Live Music Intervention (7 minutes).** For the live music intervention, the Suzuki Q-chord was used as a musical instrument by the music therapist as described in the following.

**Process.** The patient chose either to sing along or move his or her finger tips in rhythm over the Suzuki Q-chord's touch-and-motion-sensitive pad while the music therapist was singing. The song used in this live music intervention could be either a patient-selected song or a cocreated song played together by the patient and music therapist. This choice was made by the patient.

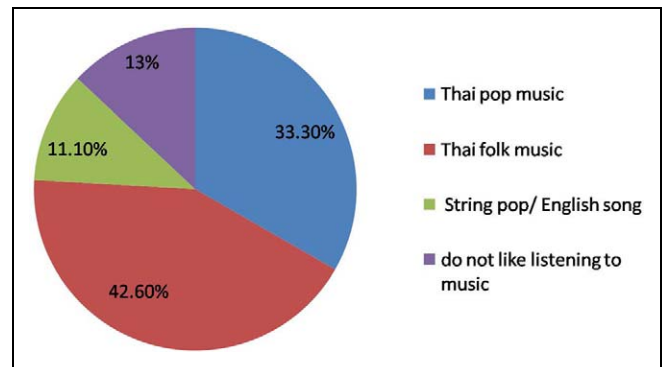
**Evaluation and Feedback (3 minutes).** The last 3 minutes of both musical interventions were for patients' oral evaluation and feedback. Patients expressed their feelings though the completed musical activity. It was found that most of the patients were satisfied by the music activities in both musical interventions.

It is important to note that randomization was applied regarding the order of music listening intervention and live music intervention to avoid the issue of order selection. During the first session, the patients were assigned to either live music or music listening by drawing lots.

The music therapist who operated the music interventions has received Music Therapist Akaboshi Method Grade 2 Certificate from Tokyo Music Volunteer Association, in 1997. He has been working with the Sawankanivas Rehabilitation Center of the Thai Red Cross as music therapist since 1989.

## Data Analysis

After the field data were collected from 108 treatment sessions (2 sessions for each of the 54 participants), the pre and post records of the mean blood pressure, pulse rate, and the self-reported scores of pain and anxiety during the sessions were analyzed. The



**Figure 2.** Patients' music preferences.

analysis involved a comparison between the 2 forms of music interventions. One was a live music, and the other was listening to recorded music via headphones/an MP3 player.

Throughout this research project, the lead researcher, the assistants, and the rest of the research team met with their advisor to ensure both the data collected and its subsequent analysis with the SPSS software package would be robust and valid.

## Results

### Participants

The average age of all participants was 69.7 years. The largest group or 51.9% were more than 60 years of age, while 27.8% were 46 to 60 years old. The smallest group or 3.7% were younger than 30, and those aged 31 to 45 made up 16.7%. The youngest participant was 21 years old and the oldest was 86 years old. The men slightly outnumbered the women at 51.9%. In all, 61.1% of the participants live in central Bangkok, 7.4% live in the suburbs of Bangkok, and 31.5% live in the rural areas or another province. Most of the participants (83.3%) have been undergoing hemodialysis for 1 to 10 years, 9.3% for less than 1 year, and 7.4% for more than 10 years.

### Musical Preferences

According to Figure 2, the most favored type of music among the participants was Thai folk music (42.6%), with the next one in line being Thai popular music (33.3%; played by a band consisting of brass wind instruments with keyboard or piano, bass guitar or cello, and a drum set). In all, 13% had no favorites or did not specify a type of music, while 11.1% liked Thai String Pop (played by a band consisting of lead, chord and bass guitars, keyboard with a set of drum, or could be with other instruments used in the present time) and English language music. The participants chose their preferred songs in advance for the live music and music listening interventions.

### Effects of Music

Table 1 shows that there was no difference in the systolic blood pressure (SBP), diastolic blood pressure (DBP), and pulse rates

**Table 1.** Mean Blood Pressure, Pulse Rate, and Pain and Anxiety Scores Pre- and Postintervention.

Type of Music Intervention	Pre	Post	P Value
<b>Live</b>			
SBP in mm Hg	147.9	144.2	.192 <sup>a</sup>
DBP in mm Hg	82.0	82.3	.799 <sup>a</sup>
Pulse rate per min	77.0	76.8	.857 <sup>a</sup>
Pain score (0-10)	2.26	1.31	<.001 <sup>b,c</sup>
Anxiety scale (0-10)	2.44	1.06	<.001 <sup>b,c</sup>
<b>Listening</b>			
SBP in mm Hg	152.9	145.1	.020 <sup>a,d</sup>
DBP in mm Hg	79.9	80.1	.895 <sup>a</sup>
Pulse rate per min	77.8	76.4	.122 <sup>a</sup>
Pain score (0-10)	2.50	1.11	<.001 <sup>b,c</sup>
Anxiety score (0-10)	2.83	1.33	<.001 <sup>b,c</sup>

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure.  
<sup>a</sup>Paired t test.  
<sup>b</sup>Wilcoxon signed rank test.  
<sup>c</sup>Level of significance at .01.  
<sup>d</sup>Level of significance at .05.

**Table 2.** A Paired t Test Comparison of Mean Changes in the Pre and Post Recordings of the SBP, DBP, and Pulse Rate in Each Form of Music Intervention.<sup>a</sup>

	Type of Intervention		Difference (95% CI)	P Value
	Live	Listening		
SBP change	3.69	7.87	-4.18 (-13.37, 5.00)	.365
DBP change	-0.35	-0.17	-18 (-3.44, 3.06)	.909
Pulse rate change	0.19	1.41	-1.22 (-3.91, 1.46)	.365

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure.  
<sup>a</sup>Using paired t test.

in the pre- and postintervention measurements ( $P > .05$ ) in patients undergoing hemodialysis in conjunction with live music intervention. However, the pain and anxiety scores are significantly different ( $P < .001$ ) and reflect a reduction in pain and anxiety scores after music intervention.

When hemodialysis treatments were paired with music listening intervention, it resulted in a statistically significant reduction in SBP ( $P = .02$ ), but no similar reduction was found in the DBP or pulse rate ( $P > .05$ ). The pain and anxiety scores pre- and postintervention in the patients undergoing hemodialysis with the music listening intervention show a statistically significant reduction as did the patients undergoing hemodialysis with live music intervention.

Table 2 illustrates a comparison between the mean changes in the pre and post recordings of the SBP, DBP, and pulse rate in those receiving hemodialysis with either live music intervention or music listening intervention. This shows there was no statistically significant changes in these indices ( $P > .05$ ).

Table 3 shows no statistical difference between the mean changes in pain and anxiety scores in each form of intervention whether it was live music intervention or music listening intervention.

**Table 3.** A Comparison Between the Means of Changes in Pain and Anxiety Scores for Live Music Intervention and Listening Music Intervention During Hemodialysis.<sup>a</sup>

	Type of Intervention		P Value
	Live	Listening	
Pain score	0.94	1.41	.784
Anxiety score	1.39	1.50	.678

<sup>a</sup>Using Wilcoxon signed rank test.<sup>6</sup>

## Discussion

Both forms of music intervention caused a statistically significant decrease in the participants, reported levels of pain and anxiety. Although each form of music intervention has its strong and weak points, both led to the same results. Live music intervention provides an engaging interaction between the music therapist and the patient, but it is more expensive than the music listening intervention. Although it is cheaper, music listening intervention provides no interaction and may not provide the same benefit to those who are already socially isolated and otherwise less involved. However, this study shows that both forms of music intervention can achieve substantial results in decreasing patients' pain and anxiety. Consequently, the patients and the care providers had the option and flexibility to use either type of music intervention, or combine them to meet their needs, personnel, facilities, and budget.

The limitations of this research were that music interventions were used only with patients during their hemodialysis sessions and that there was a small sample size, thereby making it impossible to generalize the results to other forms of dialysis.

## Conclusion

This research involving the use of music intervention in Bangkok Metropolitan Administration's hospitals found that the use of live music intervention and music listening intervention with patients undergoing hemodialysis treatment showed no difference between the 2 interventions concerning the changes in blood pressure and pain and anxiety scores. Pain and anxiety scores showed a similar decrease after both forms of music interventions.

## Suggestions

Patients that undergo hemodialysis treatment should be offered a choice of preference for their desired type of music intervention, depending upon their background, musical experience, and budget. Congruent with the positive results of this study, it is recommended that each clinic acquire a selection of musical instruments and/or music listening devices for use by their hemodialysis patients.

Music intervention can be utilized and enjoyed in all hospitals, public or private. The expanded use of music as medicine should be studied for incorporation into the therapeutic regimes

of all hospitals, clinics, mental health facilities, nursing homes, care facilities for the disabled, drug treatment centers, and across both the governmental and private sectors in order to extend the benefits of music intervention to all patients, including those who are socially disadvantaged. The government needs to encourage further research into the field of music intervention to uncover further implementation of music applications and related techniques for treating symptoms of diseases, pain reduction, and supporting optimal health alongside those of conventional medicine. Since music as medicine is a new therapeutic field for Thailand, every concerned sector should work together in creating supportive governmental policies and a solid educational curriculum for this growing scientific field.

## Appendix

### *Sampling of the Patient Selected Songs*

#### *Thai Country Songs (Luk thung)*

1. Rak Kao Thi Baan Keod (Old Love in the Hometown)  
Artist: Ekachai Srivichai
2. Saow Suan Tang (Suan Tang's Lady)  
Artist: Surapol Sombatcharoen
3. Samsib Young Jaew (30 Years Old Is Still Young)  
Artist: Yodrak Salakjai
4. Rak Khun Thao Fa (My Love to You Is Equal to the Sky)  
Artist: Sayan Sunya

#### *Thai Urban Songs (Luk Krung)*

1. Sane Ha (Feeling in Love)  
Artist: Suthep Wongkumhang
2. Lum Chao Phraya (Chao Phraya River)  
Artist: Suthep Wongkumhang
3. Reonphae (Boathouse)  
Artist: Charin Nunthanaporn
4. Duangjai (My Heart)  
Artist: Srisalai Suchatvudhi

#### *Music for Life (Plang Pheor Chevit)*

1. Dueng Phen (Full Moon)  
Artist: Bu-nga Karavek
2. Kidthung Baan (Missing Home)  
Artist: Pongthep Kradonchamnan
3. Aui Kham (Old Lady)  
Artist: Charun Manopetch
4. Talod Wela (Always)  
Artist: Pongsit Khampee

#### *Thai Traditional Music*

1. Lao Duang Deon (Name of the song related to Laotians)  
Instrumental music (Thai musical ensemble)
2. Lao Chareon Sri  
Instrumental music (Thai musical ensemble)

#### *English Pop Songs*

1. My Way  
Artist: Frank Sinatra
2. Papa  
Artist: Paul Anka
3. I Can't Help Falling in Love  
Artist: Elvis Presley

### *Questionnaire for the Patient's Music Preferences*

#### General Information

Age . . .  
 Profession . . .  
 Place of residence . . .  
 When did you start coming to the hemodialysis unit?  
 Did you get support for the costs of hemodialysis?  
 With whom do you live with?  
 Do you have difficulty in hearing or talking?

#### Musical Background

What type of music do you usually listen to?  
 What type of music do you like?  
 Who is your favorite singer or band?  
 Can you play a music instrument and what kind is it?  
 What type of music do you want to listen to during the music intervention?  
 What type of activity do you want to do during the live music intervention i.e. singing, moving fingers/hand?

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