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The Effect of Music Therapy on Anxiety and physiological variables in Patients under Spinal Anesthesia

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ABSTRACT

Aims: Surgical procedures under spinal anesthesia have special challenges for anesthesiologists; because patients are alert and are exposed to anxiety caused by visual and auditory stimuli. The aim of this study was to evaluate the effect of music therapy on level of anxiety and physiological variables in patients under spinal anesthesia.

Methods: this semi-experimental research was conducted on 90 men, aged 18-48 years with ASA (American Society of Anesthesiologists) class I, who underwent urological and abdominal surgery. Patients were randomly divided into three groups of 30, Music group (headphone with music), Silence group (headphone without music) and control group (without interference). The patient's anxiety rate was measured half hour before and after surgery by Spielberger questionnaire. Meanwhile, physiological parameters (systolic and diastolic blood pressure, heart rate and arterial blood oxygen) were monitoring and recorded in all three groups from 10 minutes before induction of spinal anesthesia until 10 minutes after surgery. Respiratory rate were observed and recorded by the researcher.

Results: There were significant differences after intervention in the levels of anxiety and systolic blood pressure between music group and the other two groups ($p<0.05$). There were no significant differences in respiratory rate and diastolic blood pressure in the three groups.

Conclusion: Listening to music during the surgery with spinal anesthesia is effective in reducing anxiety and some physiological variables. Therefore, it can be used as a complementary method to reduce patient anxiety

KEY WORDS: Music therapy, Spinal anesthesia, Anxiety, Physiological variables

INTRODUCTION

Most surgical procedures cause fear and anxiety with increasing heart rate, blood pressure and other changes on patients, which can negatively affect the induction of anesthesia and then recovery process [1-3]. Spinal anesthesia versus general anesthesia has a lower risk and lead to adequate level of analgesia for surgery. Spinal anesthesia is created with spinal nerve block in subarachnoid space by the local anesthetic solution. The use of spinal anesthesia is currently on the rise [4]. On the other hand, surgical procedures under spinal anesthesia have special challenges for anesthesiologists; because patients are alert and are exposed to anxiety caused by visual and auditory stimuli. So the anti-anxiety drugs and sedatives are regularly used before and during the surgery to provide patient tranquility. But these drugs impose huge costs to the health care system and there are the risk of addiction and drug dependence. The side effects of these drugs are suppression of cardiovascular and respiratory systems that threatens patients [5]. Nowadays, the tendency to use non pharmacological methods for relieving pain and anxiety is on the rise. One of these methods is the use of pleasant audio stimuli as music therapy [6]. Music as a non-pharmacological nursing intervention is cheap, non-invasive and without side effects that can be used as a complementary method to reduce patient anxiety [7-9]. Since music is able to establish and enhance positive feelings in people; so these effects potentially can be used on clinical fields (relief of pain and anxiety). The music can reduce stress before, during and after medical procedures such as surgery, Angiography and colonoscopy [10]. Studies have shown that relaxation music reduces sympathetic nervous system activity [11].

Many studies have been done about the effect of music on patients' pain and anxiety, before and after surgery, but limited studies have been done about the effect of music during spinal anesthesia. There is no study in our country about the effect of music during the spinal anesthesia or at least it's not available. The results of some studies have shown that the use of music before anesthesia has positive and satisfactory effects on patients [12]. Lee in 2011 divided 167 patients in to three groups of music with headphone, music without headphone and control group in the preoperative room; then assessed anxiety level before and after the music. The results showed that listening to music with headphones or without headphones compared with control group led to significant reduction in preoperative anxiety; while there was no significant difference between the two groups of music with headphones and without headphones [13]. Some studies have shown different results, that music has no effect on patient convenience and

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treatment process before, during and after surgery [14]. A study was conducted by Maeyama and colleagues in 2009 in Japan that Showed listening to music can reduce anxiety during the surgery under spinal anesthesia [15]. The main distinction of Maeyama study and this study is that Maeyama study was performed in two groups; so there is the possibility of patients' anxiety reduction due to noise block in the operating room. According to the above evidence as well as cultural, social, economical and religious differences in Iran compared to other countries, this study was performed in three groups, to effectively examine the effect of music. With the hope that it can be an effective step to reduce anxiety and improve physiological parameters in patients undergoing spinal anesthesia.

MATERIALS AND METHODS

In this semi-experimental research was studied the effect of independent variable of music therapy on dependent variables of anxiety and hemodynamic status in patients under spinal anesthesia .This study was conducted on 90 men, aged 18-48 years with ASA (American Society of Anesthesiologists) class I, who underwent urological and abdominal surgery. Patients were randomly divided into three groups of 30, Music group (headphone with music), Silence group (headphone without music) and control group (without interference). Inclusion criteria included full consciousness, ability to read and write, hemodynamic stability, not using anti-anxiety and anti-pain drugs, lack of hearing disorders, and no addiction to smoking, drugs, sedatives, alcohol, etc., no history of mental illness and anxiety, no history of surgery with spinal anesthesia and elective surgery in the morning shift. Exclusion criteria included any complications during surgery and anesthesia, expressed dissatisfaction over the continued research, the use of general anesthesia and sleep medications during the study. Sample size was determined at least 18 people in each group from the research community by using anxiety comparison before and after the intervention in group1and statistical formula with 95% confidence level. To compensate the potential loss of samples, 12 people were added in each group and finally 30 people were studied in each group. Data was collected by using demographic sheet, vital signs sheet and Spielbergers anxiety questionnaire.(Description of Measure: The State-Trait Anxiety Inventory (STAI) is a commonly used measure of trait and state of anxiety. It can be used in clinical settings to diagnose anxiety and to distinguish it from depressive syndromes. Also it is often used in research as an indicator of caregiver distress

Form Y, its most popular version, has 20 items for assessing trait of anxiety and 20 for state of anxiety. State of anxiety items include: "I am tense; I am worried" and "I feel calm; I feel secure." Trait of anxiety items include: "I worry too much over something that really doesn't matter" and "I am content; I am a steady person." All items are rated on a 4-point scale (e.g., from "Almost Never" to "Almost Always"). Higher scores indicate greater anxiety. The STAI is appropriate for those who have at least a sixth-grade reading level. In this study was used only 20 items for assessing the state of anxiety)

For selecting the samples, patients were visited in the pre operating room in the morning of surgery and randomly assigned in one of three groups based on inclusion criteria and written consent for participating in the research. The steps completely explained for each patient. Demographic data and Spielberger questionnaire were completed by patients one hour before surgery. All patients were under spinal anesthesia with 2 cc of Lidocaine 5%. During the surgery, for all patients was used Normal saline or Ringer.

All patients were in supine positions. The operation time was between half to an hour, and in case of prolonged (more than an hour), the sample was removed. Vital signs were recorded ten minutes before surgery (Upon entering the room and sleeping on the Surgical beds), then a 10-min intervals during surgery and finally 10 minutes after surgery.

In order to control Physiological parameters of blood pressure and pulse rate was used the machine Cardio set portable patient monitor model (lx 110) made in Iran. Respiratory rate were observed and recorded by the researcher. Patients listened to music by headphones from 6 minutes after spinal anesthesia to one minute before closing the surgical wound [16].

For music therapy was used wireless phone (headphone) and Marshall Company MP3 player and relaxing music for group 1. Music playback time as well as time and type of surgery were recorded for each patient. For Patients in group 2 was used the headphones without music to block out the sounds of the operating room and the control group received no intervention. Half an hour after the operation, Spielberger questionnaire was given again to the patients for assessing the post operative anxiety. In this study was used soft music of Johann Sebastian Bach [17]. Volume control and track switching were given to patients. The data was analyzed by using SPSS software and descriptive - inferential statistics including frequency distribution tables, chi-square test, paired Samples T-Test, Kruskal-Wallis, one-way ANOVA and repeated measures ANOVA.

RESULTS

(61.1%) of all subjects were single. The mean age was 23.83± 6.20 years. Minimum and maximum age respectively was 18 and 45 years. According to the research community, the samples were homogeneous in terms of marital status, occupation, education, economic status and type of surgery and there was no significant difference

(p>0.05). (Table1). Comparing the mean anxiety score was performed by using ANOVA in the three groups before the intervention. There was no significant difference between the three groups (p= 0.88). But there was significant difference in the mean anxiety score in the three groups after the intervention. (p=0.03) (Table2). Then, the groups were compared pairwise by using the post-hoc Tukey's test and it was found that the mean anxiety score in the music group compared with the other two groups, shows a significant decrease

; While there was no significant difference between the Silence group and control group (Table 3). Mean and standard deviation of music, silence and control groups was respectively (41.46± 8.79), (42.36 ± 10.15) and (41.20± 10.17) before the intervention and (35.70± 6.50), (40.96± 7.22) and (40.80± 11.31) after the intervention (table 4). Comparing before and after of the each group was performed by using paired T-test. Only in music group was significant difference between anxiety of before and after intervention (p=0.00) (Figure1).Comparing physiological parameters before music playback showed no significant difference in the three groups (p>0.05); but after the intervention, there was significant difference in the mean systolic blood pressure (p=0.00) as well as the mean heart rate (p=0.01) in the three groups. But ANOVA test revealed no significant differences in the respiratory rate and diastolic blood pressure, in the three groups. (Table 5-7). Comparing physiological variables was performed by using one- way ANOVA three times (preoperative, intraoperative and postoperative). Most of the physiological variables except arterial blood oxygen level showed descending over the time that this reduction in music group was more than the other two groups (Figure 2-5).

Discussion:

most of the methods used to reduce the complications of surgery such as pain and anxiety is based on pharmacological interventions. The aim of this study was to assess the effect of music as a non pharmacological and inexpensive intervention in reducing complications during the surgery. In this study was found that postoperative anxiety has declined in the music group than in the other two groups. This implies the effect of intraoperative music on decreasing the postoperative anxiety.

Many studies have been done on the effect of music as a complementary medicine. The majority of them emphasize on reducing costs and adverse effects in the intervention groups [18-29].The results showed, something that is effective in reducing anxiety during surgery is music not blocking the sounds of operating rooms. This implies the influence of music in reducing anxiety during the surgery. The findings of this study is compatible with the findings of Maeyama [15], Wong [19], Han [7] and also Lee researches (2011) [1, 13] about the effect of music on preoperative anxiety of patients. In this study music was effective on the reduction of intraoperative systolic blood pressure, as well as postoperative systolic blood pressure and pulse rate; whereas no significant change was in diastolic blood pressure and respiratory rate. Bansal and colleagues in 2010 evaluated the effect of music on using sedative drugs and physiological variables during spinal anesthesia. Their study showed that music leads to decrease mean arterial blood pressure and heart rate in music group than in control group [5]. Alemrud and colleagues in 2003 performed a research as music therapy in mechanically ventilated patients in intensive care unit. Their results showed that the mean systolic and diastolic blood pressure and pulse rate had significant reduction in the intervention group during music therapy.

But the mean respiratory rate was similar in both groups and no change was observed in the intervention group [30]. Alemrud believes music effect on the brain and stimulate the brain's alpha waves and lead to secretion of endorphins and by creating relaxation, cause to reduce the fear and anxiety. Also the secretion of endorphins reduces physiological responses such as blood pressure, respiratory rate and heart rate [30]. Smolen justified the changes in physiological parameters which were because of listening to music with regard to Roy's adaptation model and say that music can help patients to have physiological adaptations with medical conditions[31]. This study showed that music therapy can have positive effects on patients' anxiety and some vital signs. So, In order to improve the quality of health care services to patients, hospital administrators are recommended to use non- pharmacological methods such as music therapy along with other therapies to relieve pain and anxiety that are also effective on vital signs and are without side effects. Also nursing managers and hospital administrators are recommended to know Music therapy as a scientific concept and want from the nurses to use music therapy along with other non-pharmaceutical methods that is beneficial, effective and without side effects for more and better care of patients.

Table1. Demographic Characteristics

	Music group(n=30) Frequency(percent)	Silence group(n=30) Frequency(percent)	Control group(n=30) Frequency(percent)	P value
Marital status				
Single	19 (63.3%)	18 (60%)	18 (60%)	NS*
Married	11 (36.7%)	12 (40%)	12 (40%)	
Level of education				
Primary school	5 (16.7%)	6 (20%)	4 (13.35)	
The Junior School	8 (26.7%)	9 (30%)	5 (16.7%)	
High school	12 (40%)	8 (26.7%)	12 (40%)	NS*
advanced	5 (16.7%)	7 (23.3%0	9 (30%)	
Employment Status				
Worker	4 (13.3%)	4 (13.3%)	3 (10%)	
Employee	8 (26.7%)	7 (23.3%)	8 (26.7%)	NS*
Self-employed	11 (36.7%)	11 (36.7%)	11 (36.7%)	
Unemployed	7 (23.3%)	8 (26.7%)	8 (26.7%)	
Economic situation				
Weak	22 (73.3%)	20 (66.7%)	21 (70%)	
Middle	7 (23.3%)	9 (30%)	8 (26.7%)	NS**
Good	1 (3.3%)	1 (3.3%)	1 (3.3%)	
Types of surgery				
Abdominal	5 (16.7%)	4 (13.3%)	5 (16.7%)	NS*
Urology	25 (83.3%)	26 (86.7%)	25 (83.3%)	

NS = not significant; * Chi-square test; ** Kruskal- Wallis test; A P value < 0.05 was considered significant

Table2. The comparison of the average anxiety before and after the interference in all three groups

	Music group (Mean ± SD)		Silence group (Mean ± SD)		Control group (Mean ± SD)		One-way ANOVA	
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
The level of anxiety	41.46 ± 8.79	35.70 ± 6.50	42.36 ± 10.15	40.96 ± 7.22	41.20 ± 10.17	40.80 ± 11.31	p=0.88	p=0.03

Table 3: Comparison of mean and standard deviation of pre- and postoperative physiologic variables in patients undergoing spinal anesthesia in three groups

	Music group (Mean ± SD)		Silence group (Mean ± SD)		Control group (Mean ± SD)		One-way ANOVA	
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
Systolic blood pressure	134.70 ± 13.63	115.27 ± 6.58	133.93 ± 13.67	126.80 ± 12.23	130 ± 9.90	120.00 ± 9.49	P=0.308	P=0.000*
Diastolic blood pressure	75.90 ± 7.24	64.60 ± 6.44	77.53 ± 9.34	69.60 ± 8.92	74.13 ± 11.37	68.16 ± 1.04	P=0.384	P= 0.081
Pulse	82.23 ± 6.43	71.23 ± 12.04	86.43 ± 14.85	80.60 ± 10.90	84.70 ± 15.37	78.60 ± 16.20	P=0.450	P=0.019*
Respiratory rate	18.96 ± 2.25	17.10 ± 1.98	18.83 ± 2.13	18.26 ± 2.14	19.03 ± 2.53	18.23 ± 2.07	P=0.944	P= 0.051

* The decrease in means of systolic blood pressure and pulse was statistically significant (p<0.05).
TUKEY test showed that significant reduction in music group compared with control and silence groups (Music, Silence p=0.000; Music, Control p=0.210; Silence, Control p=0.013)

Figure 1: The comparison of the average level of anxiety before and after interference in all three groups using paired t-test

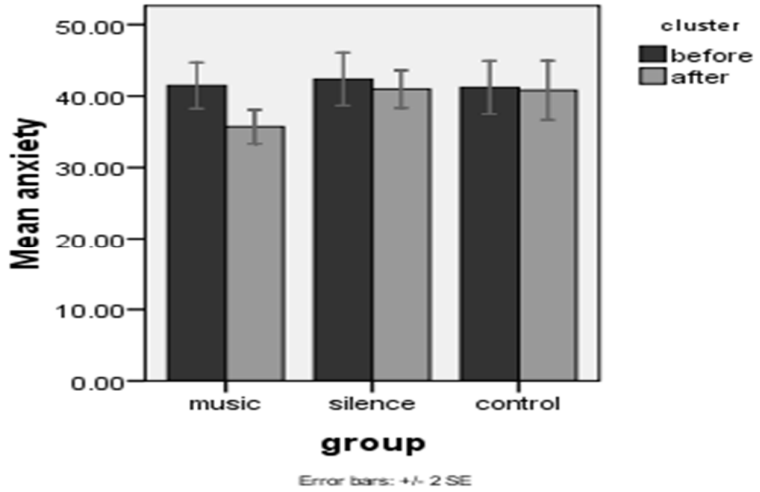
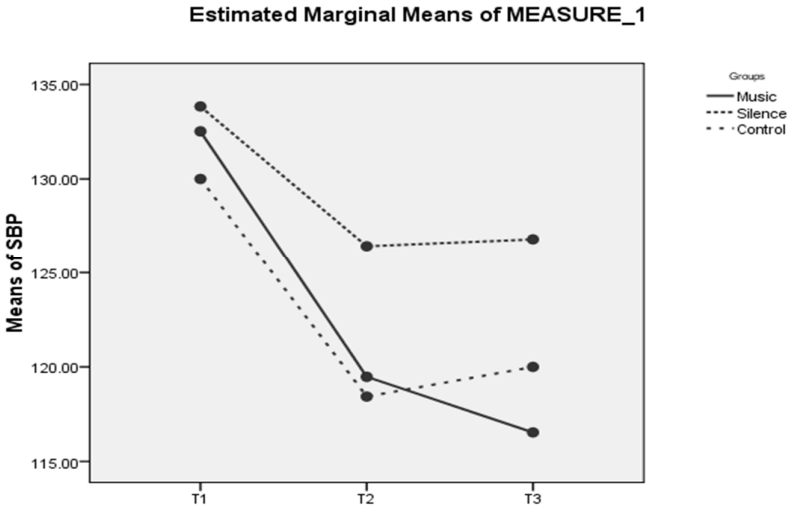
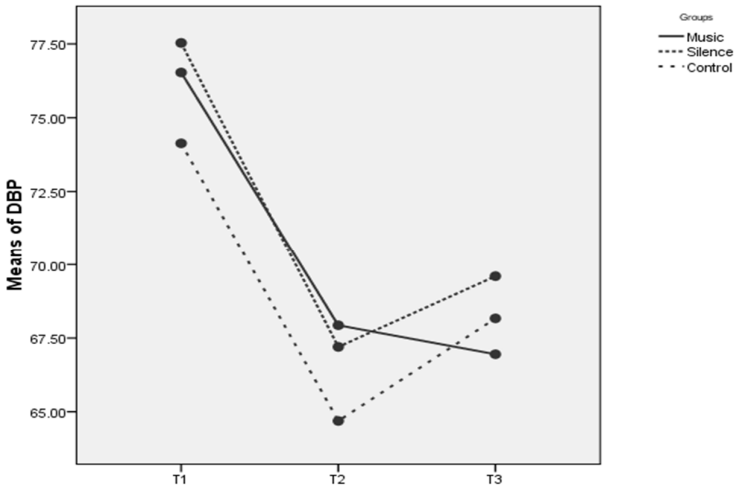


Figure 2: Comparison of systolic blood pressure; Repeated Measures ANOVA



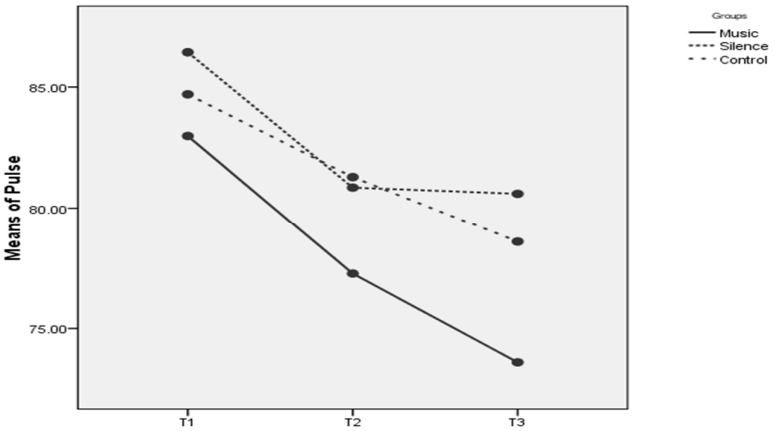
T1: pre operative; T2: intra operative; T3: post operative; SBP: Systolic Blood Pressure

Figure 3: Comparison of diastolic blood pressure; Repeated Measures ANOVA



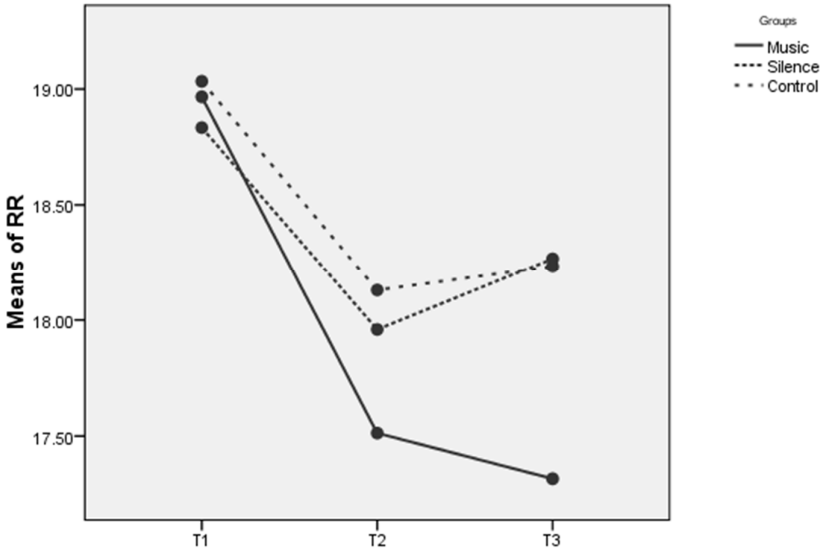
T1: pre operative; T2: intra operative; T3: post operative; DBP: Diastolic Blood Pressure

Figure 4: Comparison of pulse repeated measures ANOVA



T1: pre operative, T2: intra operative; T3: post operative

Figure 5: Comparison of respiratory rate; repeated measures ANOVA



T1: pre operative, T2: intra operative; T3: post operative; RR: Respiratory Rate

DISCUSSION

The results showed that music is effective on reducing anxiety and improving the hemodynamic status of patients under spinal anesthesia. By considering the benefits of music such as easy access, simplicity, low costs and Safety compared with pharmaceutical methods, is recommended to use music as a complementary method for reducing intraoperative anxiety in patients under spinal anesthesia.

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