Original Article

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The Effect of Music on the Anxiety of Mothers of Infants Admitted to the Neonatal Intensive Care Unit

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ABSTRACT

BACKGROUND AND OBJECTIVE: Mothers with premature infants often experience a lot of anxiety, and since music has positive effects on anxiety, the present study was conducted to investigate the effect of music on the anxiety of mothers of infants admitted to the neonatal intensive care unit.

METHODS: This clinical trial was performed on 120 mothers with infants admitted to the neonatal intensive care unit of Rouhani Hospital in Babol and Bu-Ali Sina Hospital in Sari. Samples were randomly divided into two groups of experimental and control each consisting of 60 patients. In the experimental group, relaxing music was played daily through mobile phones and headphones for each mother individually for 10 minutes in 10 sessions. No intervention was performed for the control group. Both groups of mothers completed the Spielberger State-Trait Anxiety Inventory (STAI) before the start of the study and on the tenth day and were compared.

FINDINGS: The mean age of mothers was 27.8±5.71 years and the mean age of infants was 3.92±3.88 days. In this study, anxiety was relatively severe or severe in 60% of mothers before the intervention. Levels of overt anxiety and covert anxiety in mothers of music groups before the intervention (59.48±13.66), (55.62±12.26) showed a significant decrease compared to after the intervention (31.27±6.57), (33.08±8.66), respectively ($p<0.0001$).

CONCLUSION: The results of the study showed that music is effective in reducing the anxiety of mothers with infants admitted to the neonatal intensive care unit.

KEY WORDS: *Music Therapy, Anxiety, Mothers, Infants, Neonatal Intensive Care Unit.*

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Introduction

Ten percent of births in the world are premature and the complications of premature infancy lead to infant mortality (1). The birth of a premature infant affects the development of the infant and may have mental health risks for the mother and the mother-infant relationship (2, 3). In preterm birth situations, there is a need for timely interventions at the national and international levels with an emphasis on family-centered and individual care (4). Following the hospitalization of a premature infant immediately after birth, mothers experience high levels of anxiety (5). Gray et al.'s study showed that mothers with sick infants experience more anxiety and stress than mothers with healthy infants (6). This can lead to a decrease in breast milk production and consequently have an adverse effect on the infant's health (7).

High prevalence of anxiety in mothers can be due to environmental, cultural, social conditions and mothers' lack of familiarity with postpartum issues, including infant care (8). The use of non-pharmacological methods to promote mental health and reduce anxiety in mothers with premature infants is increasing. Lali et al. in their study showed that back massage had a significant effect on reducing anxiety in mothers of premature infants (5). In the study of Zahedpasha et al., the results showed that kangaroo mother care had a positive effect on mental health and anxiety of mothers of preterm infants (9).

Another non-pharmacological method is the use of pleasant vocal stimuli, called music therapy (7). Music therapy is the specialized use of music or its elements as an intervention in various medical, educational and daily life environments for people who seek to improve their quality of life and health (10). Music has always played a calming and invigorating role in human life, stabilizing vital signs and having positive effects on anxiety (11). Ettenberger et al. in a study stated that family-centered music therapy reduces parental anxiety and improves neonatal health indicators (12). Ribeiro et al. also showed that music therapy improves the anxiety and depression of mothers of premature infants (13). In another study, it was shown that music significantly reduces the anxiety of patients undergoing surgery (14).

Due to the high prevalence of stress and anxiety during pregnancy and after pregnancy and adverse effects on maternal and infant health, especially mothers with infants admitted to the intensive care unit at birth and in the following months (15), which is described as a painful and stressful situation for mothers and due to the favorable effects of music therapy and being a safe, cheap and simple treatment and since this method has not been used in Iran, the present study was conducted to determine the effect of music therapy on the anxiety of mothers of infants admitted to the neonatal intensive care unit.

Methods

This randomized clinical trial study was approved by the ethics committee of Babol University of Medical Sciences with the code MUBABOL.HRI.REC.1396.42 and registered in the clinical trial system with the code IRCT20170820035793N2 in 2018 and conducted among 120 mothers admitted to the neonatal intensive care unit of Rouhani Hospital in Babol and Bu-Ali Sina Hospital in Sari.

First-time mothers with literacy, no known maternal history of alcohol and addictive drugs and psychotropic substances, no chromosomal abnormalities or severe critical conditions such as intraventricular hemorrhage and cardiac arrest at birth were included in the study. In case of history of chronic physical and neurological diseases of the mother, the mother's lack of cooperation to continue during the intervention and taking sleeping pills by the mother on the day of intervention, they were excluded from the study.

The number of samples was calculated using the volume formula and considering the test power of 80%, 95% confidence level and the effect size of 0.5, anxiety was measured in the two groups.

Data were collected using the Spielberger questionnaire. This questionnaire had two parts: 1- Demographic information such as age and level of education of the mother, age of the baby, birth rank, gestational age, weight and gender of the infant, number of children, etc. 2- The State-Trait Anxiety Inventory (STAI): This questionnaire includes separate self-assessment scales to measure overt and covert anxiety. The overt anxiety scale (form y-1 of STAI) consists of twenty statements that assess a person's feelings “at the moment and at the time of responding.” The covert anxiety scale (form y-2 of STAI) also includes twenty statements that measure a person's general and normal emotions (16).

Each STAI statement is assigned a weight of 1 to 4 based on the answer provided. A score of 4 indicates a high presence of anxiety, on which ten statements of overt anxiety scale and eleven statements of covert

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anxiety scale are scored. To score other statements, high score for each statement indicates non-anxiety, which includes ten overt anxiety statements and nine covert anxiety statements.

To obtain a person's anxiety score in each of the two scales, considering the fact that some statements are scored in reverse, the sum of the scores of twenty statements in each scale was calculated. Thus, the scores of each of the two scales of overt and covert anxiety can be in the range of 20-80 (17).

The interpretation criteria for overt and covert anxiety based on the normative research of overt and covert anxiety test are as follows (18):

Over anxiety: mild anxiety: anxiety rate of 20-31, moderate anxiety: anxiety rate of 32-53, severe anxiety: anxiety rate of 54 and above.

Covert anxiety: mild anxiety: anxiety rate of 20-31, moderate anxiety: anxiety rate of 32-52, severe anxiety: anxiety rate of 53 and above.

The validity and reliability of the Spielberger test were evaluated in several national studies. Mahram et al. reported the reliability of this test for the normal group (600 people), in the scale of overt and covert anxiety based on Cronbach's alpha equal to 0.9084 and 0.9025, respectively, and this rate in the criterion group (130 people) was reported to be 0.9418 (19).

In this study, 120 eligible mothers were selected through convenience sampling. With informed consent, they were first asked to complete the Spielberger Anxiety Inventory. Then, the questionnaires were randomly marked without music and with music and the mother who randomly took the questionnaire with music was assigned into the intervention group (60 people) and the mother who received the questionnaire without music was assigned into the control group (60 people).

At 4 o'clock, during which the ward is less crowded, relaxing music (non-verbal Iranian) by one composer in different tracks, and selected by the mother, was played for each mother via mobile and headphones for 10 minutes in 10 sessions for intervention group. In contrast, no intervention (music playback) was performed for the control group, but because they were in the study group, we contacted them and talked about their presence and the condition of their baby. After the tenth session, the questionnaire was completed again by the mothers of both groups. In order for people to be honest in answering the test and for the answers to be objective and real, mothers were told that their answers would be kept secret and the results would be reflected to them.

Data were entered into SPSS 22 software and statistically analyzed using Chi-square, independent t-test, paired t-test, and Fisher's exact test and $p < 0.05$ was considered significant.

Results

In this study, the mean age of mothers was 27.8±5.71 years and the mean age of infants was 3.92±3.88 days. Mothers of the two groups did not differ significantly in terms of demographic characteristics (Table 1).

Table 1. Frequency distribution and percentage of demographic characteristics of the studied groups

Variable	Music group Number(%) or Mean±SD	Control group Number(%) or Mean±SD	P-value
Mothers' education			
High school	5(8.3)	9(15.0)	0.114
High school diploma	23(38.3)	30(50.0)	
University	32(53.3)	21(35.0)	
Total	60(100.0)	60(100.0)	
Age of mothers			
Under 35 years	50(83.3)	51(85.0)	0.803
Above 35 years	10(16.7)	9(15.0)	
Total	60(100.0)	60(100.0)	
Gender of infant			
Girl	27(45.0)	26(43.3)	0.854
Boy	33(55.0)	34(56.7)	
Total	60(100.0)	60(100.0)	
Gestational age			
25 to 30 weeks	9(15.0)	4(6.7)	0.338
31 to 35 weeks	16(26.7)	17(28.3)	
36 to 40 weeks	35(58.3)	39(65.0)	
Total	60(100.0)	60(100.0)	
Age of infants			
1 to 6 days	45(75.0)	46(76.7)	0.831
7 days and more	15(25.0)	14(23.3)	
Total	60(100.0)	60(100.0)	
Infant weight	2811.67±819.23	2838.33±822.02	0.859

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The results showed that the score of overt anxiety in the music group after the intervention decreased from 59.48±13.66 to 31.27±6.57 (p<0.0001) (Figure 1). According to the results of this study, in both groups before the intervention, the level of overt anxiety in more than 50% of mothers was relatively severe to very severe. Fisher's exact test showed that the two groups did not differ in the level of overt anxiety before the intervention (p=0.395). But after the intervention, the two groups differed (p<0.0001) (Table 2). The results showed that the covert anxiety score after the intervention in the music group decreased from 55.62±12.26 to 33.08±8.66 (p<0.0001) (Figure 2). In this study, in both groups before the intervention, the level of covert anxiety in more than 50% was relatively severe to very severe range. Fisher's exact test showed that the two groups did not differ in the level of covert anxiety before the intervention (p=0.304). But after the intervention, the two groups differed (p<0.0001) (Table 3).

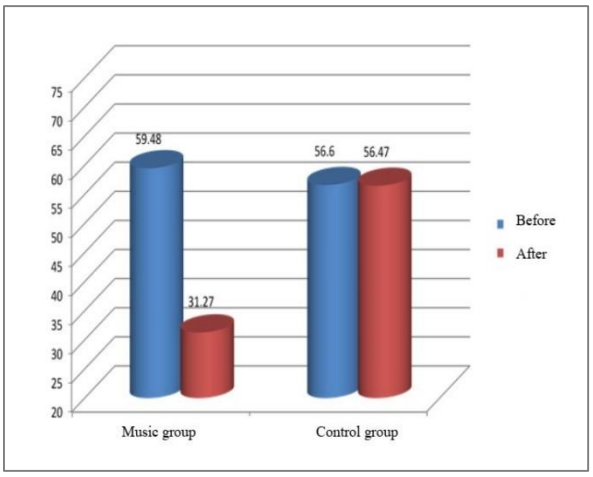


Figure 1. Comparison of the level of overt anxiety in the two groups before and after the intervention

Table 2. Comparison of the level of overt anxiety before and after the intervention based on study groups

Study groups / Anxiety level	Before intervention: Music Number(%)	Before intervention: Control Number(%)	P-value	After intervention: Music Number(%)	After intervention: Control Number(%)	P-value
Mild anxiety	0(0)	2(3.3)	0.395	37(61.7)	2(3.3)	0.000
Moderate to low anxiety	6(10)	4(6.7)	0.395	22(36.7)	4(6.7)	0.000
Moderate to high anxiety	15(25)	18(30)	0.395	1(1.7)	14(23.3)	0.000
Relatively Severe	13(21.7)	16(26.7)	0.395	0(0)	27(45)	0.000
Severe	18(30)	17(28.3)	0.395	0(0)	8(13.3)	0.000
Very severe	8(13.3)	3(5)	0.395	0(0)	5(3.8)	0.000
P-value						
Music			0.000			
Control			0.108			

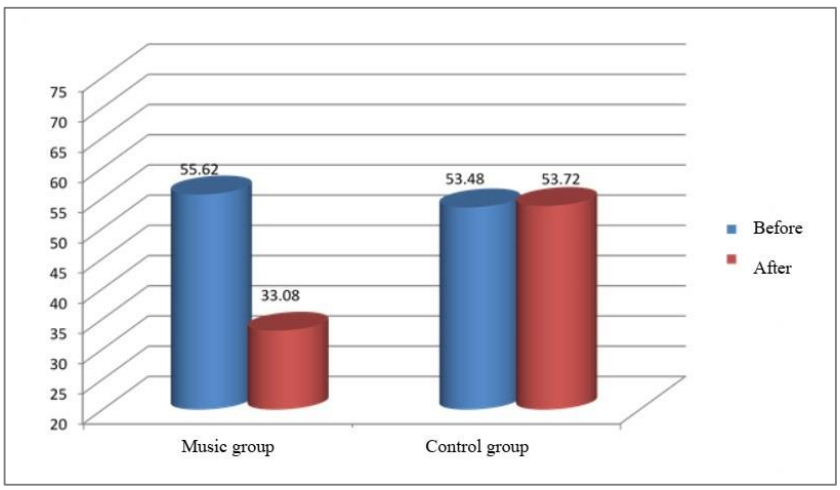


Figure 2. Comparison of covert anxiety levels in the two groups before and after the intervention

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Table 3. Assessing the level of covert anxiety before and after the intervention based on study groups

Study groups / Anxiety level	Before intervention			After intervention		
	Music Number(%)	Control Number(%)	P-value	Music Number(%)	Control Number(%)	P-value
Mild anxiety	0(0)	0(0)	0.304	34(56.7)	1(1.7)	0.000
Moderate to low anxiety	12(20)	9(15)	0.304	16(26.7)	7(11.07)	0.000
Moderate to high anxiety	14(23.3)	18(30)	0.304	9(15)	18(30)	0.000
Relatively Severe	16(26.7)	20(33.3)	0.304	0(0)	24(40)	0.000
Severe	12(20)	12(20)	0.304	1(1.7)	10(16.7)	0.000
Very severe	6(10)	1(1.7)	0.304	0(0)	0(0)	0.000
P-value						
Music				0.000		
Control				0.982		

Discussion

The results of the present study showed that music reduces overt and covert anxiety in mothers of neonates admitted to the intensive care unit. In this regard, Liu et al. in their research showed that music therapy significantly reduced maternal pain and anxiety (20). In another study, the results showed that music significantly reduced the anxiety of patients undergoing surgery (14). In fact, music affects the brain and stimulates alpha-brain waves, leading to the release of endorphins and reduces anxiety by creating relaxation (21).

In a clinical trial, Ribeiro et al. showed that mothers of premature infants showed less anxiety and depression in the music therapy group (13). Since music is considered to be a fun and enjoyable factor, it can play a facilitating role in calming the mothers of infants admitted to the neonatal intensive care unit. In another study, the results showed that music therapy as an easy intervention led to improving the mental, emotional and physical condition of mothers and infant and had positive effects on maternal comfort and attachment between mother and infant (22).

In a meta-analysis, Bieleninik et al. showed that music therapy had positive and significant effects on neonatal respiration and maternal anxiety (23). In a study, Dabas et al. found that using relaxation techniques combined with music significantly reduced stress, anxiety, and improved breastfeeding (24). In the study of Rabiee et al., the anxiety of mothers undergoing cesarean section decreased at 30 and 60 minutes after music therapy (25). A study by Nanbakhsh et al. found that music was relaxing and reduced the anxiety and pain of women giving birth. Explaining the above findings, it can be said that psychological damage, often due to biased and extreme thinking persists and is aggravated by distortion of data processing (26).

One of the limitations of the present study is its cross-sectional nature, and more detailed longitudinal studies are required to confirm the causal relationship between music therapy and mental disorders. This study provides evidence that mothers of neonates admitted to the intensive care unit benefit from music therapy. In fact, the strength of this research, in addition to its great impact, is the use of an easy non-invasive, non-pharmacological and low-cost method to complete medical treatments. The present study showed that music reduces the anxiety of mothers of infants admitted to the intensive care unit. Listening to music avoids unpleasant thoughts and thus reduces mothers' anxiety. Therefore, in order to reduce maternal anxiety and the negative effects of hospitalization of infants, it is suggested that mothers be given the opportunity to listen to music during care in the intensive care unit.

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