Original Article

The Effect of Non-verbal Music on Posttraumatic Stress Disorder in Mothers of Premature Neonates

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Abstract

Background: Hospitalization of a premature neonate in the Neonatal Intensive Care Unit (NICU) is stressful for mothers. They show symptoms of Post-Traumatic Stress Disorder (PTSD). It is important to use the proper strategy to manage PTSD. This study was designed to investigate the effect of non-verbal music on the PTSD in mothers of premature neonates hospitalized in NICU. **Materials and Methods:** In this clinical trial study, the convenience sampling method was applied and 45 mothers of premature neonates were selected and categorized randomly into the intervention (N = 23) and control (N = 22) groups in 2018. The babies were hospitalized in one of the NICUs in Yazd (Iran). The intervention group were supposed to listen to the non-verbal music for 20 minutes daily for two weeks using MP3 player and headphones. All participants completed the Perinatal PTSD Questionnaire (PPQ). The data were analyzed by SPSS 21 using paired t-test, independent *t*-test, and Chi-square test. **Results:** The PTSD mean (SD) scores before and after the intervention was 9.39 (1.67) and 4.39 (1.49), respectively, in experimental group. It was 8.54 (1.59) and 5.31 (1.71) in control group. The severity of PTSD decreased in the intervention ($p = 0.003$) and control ($p < 0.001$) groups after the intervention. The difference between the two groups was significant ($F_{1,07} = 1058$, $p < 0.03$), which confirmed the significant effect of the non-verbal music on decreasing the PTSD severity (0.92). **Conclusions:** Non-verbal music can be used as an effective and low-cost intervention for managing PTSD in mothers of premature neonates hospitalized in the NICU.

Keywords: *Iran, mothers, music, posttraumatic, premature birth, stress disorders*

Introduction

Post-Traumatic Stress Disorder (PTSD) is a syndrome caused by exposure to life-threatening events.[1,2] Premature birth and hospitalization in the NICU causes PTSD in mothers.[3] Compared with mothers with healthy babies, mothers of high-risk infants tend to exhibit a higher prevalence of PTSD. The prevalence of PTSD in mothers of high-risk infants who require NICU care is 24 to 44%.[4] They undergo four main sources of stress: The infant's appearance and behavior, the use of sophisticated medical language, the application of sophisticated technology, and loss of parental roles.[5,6] Potential stressors include some problems related to the infant's health. High rates of anxiety symptoms have been documented in parents with negative consequences for subsequent parental mental health and child outcomes.[7,8] The mothers need to get familiar with the NICU environment during the first weeks of life. Mother's early involvement in taking care of the neonate should be considered a primary objective to prevent from PTSD.[9] Sometimes, planned music therapy sessions in Kangaroo Care (KC) have to be changed to sessions at the bedside of the infant because the infant is too medically unstable for KC.[10]

Considering that music is enjoyable and widely used in all cultures and ages, some studies investigated the role of music therapy on reducing PTSD in mothers of hospitalized premature neonates. There is some evidence to suggest that individuals with PTSD may derive benefits from music therapy.[11]

Based on the findings of a research (2012), music therapy decreased the severity of PTSD symptoms significantly in the intervention group.[12] The music has a calming effect, reduces the heart rate, deepens breathing, and reduces anxiety and

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depression.[13] According to the literature, it is effective in reducing anxiety and restlessness in those hospitalized in the intensive care units.[13-15] Kim and co-workers (2015) stated that PTSD was present in 25 and 9% of NICU mothers and controls, respectively.[4] Non-verbal music can change a person's mood and perhaps even improve it.[16] Considering the limited number of related studies in this field, the effect of music on managing the mental problems, and music therapy's lack of side effects and low cost, this research was conducted. The aim was to investigate the effect of nonverbal music on PTSD in mothers of premature infants hospitalized in the NICU.

Materials and Methods

This randomized clinical trial was conducted using a double-blind design with the code of IRCT20160929112230N4. It was done in one of the NICUs in Yazd between April and December 2018. The participants consisted of mothers of premature neonates without anomaly and disorder. The sample size was calculated as 44 (22 members in each group) using a pilot study on 15 patients with similar conditions[8] with respect to 95% confidence interval, test power of 80%, significance level of 5%, and the loss probability of 10%. The samples were selected by convenience sampling and divided randomly into the intervention and control groups. The study was planned in such a way that neither the mothers nor the observer knows who is in which group. The inclusion criteria were having willingness to participate in the research, complete alertness, ability to read and write, no hearing impairment, no drug addiction, no history of consuming anxiety and depression medications up to one month before the study, no history of PTSD, no record in NICU, no history of preterm birth and abnormal infant, and receiving a score of higher than six from the Perinatal PTSD Questionnaire (PPQ). Exclusion criteria included taking sedative and anti-anxiety drugs, experiencing a stressful accident during the study and suffering from moderate to severe depression and anxiety during the study. Also, mothers did not use other methods of reducing stress, such as reading or listening to the Quran. Mothers whose babies have chronic abnormalities and are in the final stages of life excluded from the study. The confounder factors controlled by randomization method. The participants were selected among the individuals with PTSD who gained six scores or higher in the PPQ or their disease was diagnosed by a psychiatrist. Reliability of PPQ was determined by Cronbach's alpha coefficient of 90%. Also, content validity was confirmed.[16] It contained 14 yes/no questions to identify mothers with PTSD. Demographic information included maternal age, education level, occupation, ability to pay for the hospital expenses. The first 50 mothers were registered as control and the intervention group [Figure 1].

Initially, 50 mothers completed informed consent forms and demographic information questionnaire during the first week after delivery. Next, the PPQ was administered (stage one: during the first four weeks of birth and stage two: two to four weeks after the stage one). The participants were randomly categorized into the intervention and control groups using a box containing some cards on which the words C (control) and M (music) were written. Each participant selected a card from the box. Matching was performed for two groups. The intervention group members listened to the non-verbal music for 20-30 minutes[17] daily within two weeks during the evening shift (17-18 pm) next to their babies' incubator. The music was the same for all participants. It confirmed by two psychologists. They were explained to use MP3 player and headphones (Samson Z25) to playback the music. The music included sound of rain, sea, and the nature. It has a slow, gentle, and soothing rhythm. The PPQ completed four weeks after the intervention.

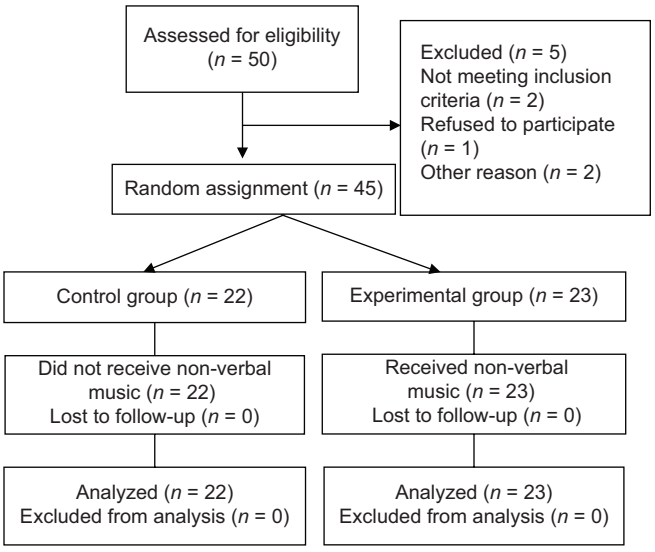

Figure 1: Consort diagram of randomization, allocation, follow-up, and analysis

The statistical analysis was performed by SPSS for Windows version 21 (IBM Corporation, Armonk, NY, USA). Paired t-test (for comparison before and after intervention), independent *t*-test, and Chi-square test were used for data analysis. The *P* value of less than 0.05 was considered significant.

Ethical considerations

The proposal of this research was approved by the Ethics Committee of Yazd Shahid Sadoughi University of Medical Sciences (IR.SSU.RSI.REC.1395.14). The anonymity and authority of participants were maintained. Also, they filled the consent form. The music was provided to the control group after intervention in the experimental group.

Results

The mean (SD) of the mothers' age in the intervention and control groups were 28.13 (5.94) and 28.04 (5.26),

respectively ($p = 0.12$). Table 1 shows no significant difference between the two groups with regard to other demographic variables ($p > 0.05$). The findings of Table 2 represent that the mean severity of PTSD was not significantly different between the intervention and control groups (t = 1.73, $p = 0.09$), but after the intervention this difference was significant (t = 2.30, $p = 0.02$). Results of the paired t-test indicated that severity of the PTSD decreased significantly after the intervention in the experimental group ($F_{1,57} = 1046$, $p = 0.003$). Table 3 also represents that difference between the two study groups was significant regarding the severity of PTSD ($F_{1,07} = 1058$, $p = 0.03$). The severity of PTSD decreased in the intervention group after the intervention (0.92).

Discussion

In this study the severity of PTSD decreased after the intervention. Listening to non-verbal music reduced severity of PTSD in mothers of premature infants significantly. It promotes emotional bonding between the mother and baby and reduces the mother's stress consequently. It also helps the mother to adjust herself to the NICU environment and all the medical equipment attached to the baby.[18] Also, creative music therapy for parents has emerged as a promising family-integrated early intervention involving communicative musicality to improve parental well-being and bonding.[10]

Music is considered as a way of expressing emotions, identifying values, making decisions, and acting.[19,20] Our results showed that non-verbal music reduced their PTSD. The music can decrease negative emotions of fear in mothers. It exposes them to the unwanted memories and creates a mood that the mother has always avoided or attempted to suppress.[21] The music causes emotional exhilaration, and modulates the exposure environment is of great importance. Our findings were consistent with past studies.[22-26] Arab *et al*. (2016) also introduced classical music as an easy, low cost, and uncomplicated method to reduce the anxiety level of patients.[27] Music disrupts the sympathetic nervous system and decreases the adrenergic activity. In addition, endorphin release enhances the feeling of well-being.[28,29] Good music regulates the internal processes that enhance the power of immunity and psychosocial integration by establishing a state of relaxation.[30] Music therapy may enhance the widely used approach of KC by reducing stress, promoting relaxation, and intensifying feelings of safety and connectedness.[10] One limitation of this study was application of the available sampling method. Also, if this study was done in longer time, the results were more generalizable. PTSD symptoms persisted in mothers one to two months after the premature infants' birth, so effective interventions as non-verbal music should be taken for them.

Conclusion

Non-verbal music can be used as an effective and low-cost intervention for decreasing PTSD in mothers of premature neonates hospitalized in the NICU. Application of non-verbal music is recommended to reduce mothers' stress as a valuable and reliable method. Other similar studies can focus on fathers or other family members of the premature infants. Further studies are needed to explore protective factors for mothers and to determine risk factors of PTSD.

Table 1: Demographic characteristics of mothers in two study groups

Variable		Intervention group *n* (%)	Control group *n* (%)	*p*
Education	Primary and secondary schools	3(13.04%)	6(27.27%)	0.53
	Diploma and associate degree	13(56.52%)	11(50.00%)	
	Bachelor's degree and higher	7(30.44%)	5(22.73%)	
Occupation	Housekeeper	19(82.61%)	19(86.37%)	0.54
	Employee	2(8.69%)	1(4.54%)	
	Worker	1(4.35%)	0(0.00)	
	Self-employed	1(4.35%)	2(9.09%)	
Affordability of the hospital costs	Yes	9(39.13%)	14(63.63%)	0.25
	No	14(60.87%)	8(36.37%)	
History of physical diseases	Yes	4(17.39%)	2(9.09%)	0.70
	No	19(82.61%)	20(90.91%)	
History of consuming antidepressant and anxiety medications	Yes	0(0.00)	2(9.09%)	0.32
	No	23(100.00%)	20(90.91%)	
History of high risk pregnancy	Yes	6(26.08%)	7(31.81%)	0.12
	No	17(73.92%)	15(68.19%)	
Abortion history	Yes	6(26.08%)	7(31.81%)	0.48
	No	17(73.92%)	15(68.19%)	
Unwanted recent pregnancy	Yes	2(8.69%)	5(22.72%)	0.12
	No	21(91.31%)	17(77.28%)	

Table 2: The PTSD mean scores in two groups before and after the intervention

Group	*n* (%)	PTSD* mean (SD) before	PTSD mean (SD) after
Intervention	23 (52.17)	9.39 (1.67)	4.39 (1.49)
Control	22 (47.83)	8.54 (1.59)	5.31 (1.17)
p		0.09	0.02

*Post-Traumatic Stress Disorder

Table 3: Comparison of the mean difference of PTSD severity in the two groups before and after the intervention

Intervention group	Control group	Mean (SD)	*p*
n=23	*n*=22	-0.92 (0.41)	0.03

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Conflicts of interest

Nothing to declare.

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