



Investigating the effect of listening to the Holy Quran on the physiological responses of neonates admitted to neonatal intensive care units: A pilot study



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ABSTRACT

Aim: Humans respond instinctively to harmonious and rhythmic sound, and this response remains throughout life. The purpose of this study is to investigate the effect of listening to the Holy Quran on the physiological responses of neonates admitted to neonatal intensive care units.

Methods: The study sample consisted of 64 preterm neonates admitted to the neonatal intensive care units (32 of whom were in the Quranic voice group and 32 in the control group) in Iran. Neonates' physiological responses including heart rate, respiratory rate, arterial oxygen saturation percentage, mean arterial pressure and temperature were recorded every 10 min in three stages: immediately before the intervention, during the intervention (minutes 10 and 20 from the onset of intervention) and 10 min after the intervention.

Results: During the intervention and 10 min after the intervention, the mean heart rate of the neonates in the intervention group was significantly lower than neonates in the control group. The mean respiratory rate of neonates was significantly less in the intervention group during the intervention ($P < 0.001$). The results indicated that the mean oxygen saturation percentage in neonates was significantly higher in the intervention group during ($P < 0.001$) and 10 min after the intervention ($P = 0.018$). The results of this study showed that the mean arterial pressure of neonates was significantly less in the intervention group 10 min after the intervention ($P < 0.01$). Based on the results, no significant differences in the mean body temperature of neonates between the two groups in all times were found.

Conclusion: In this study, the Quranic voice was used and its effects on the vital signs of the neonates admitted to NICUs were evaluated. Based on the findings of this study, listening to voice of Quran may have a positive effective on neonate vital signs in NICU.

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1. Introduction

Some neonates need to be admitted to the neonatal intensive care units (NICUs), for various reasons, after birth. Although the development and implementation of new technologies and creation and deployment of medical and nursing specialties associated with neonates have reduced the mortality rate of this group of neonates, admission to these sections also has risks and complications for them. Given the specific conditions of these neonates, they need to receive different sensory stimuli in an appropriate range. Because of the numerous sources of noise in the NICU, neonates admitted to these units are at risk of excessive

sensory stimulation of hearing [1]. These excessive stimulations can lead to changes in their physiological symptoms [1,2].

Researchers have focused attention in recent years to reducing the destructive effects of noises on neonates admitted to the NICUs by studying different methods. One such method used to improve neonatal outcomes is music. Music therapy is the way in which music applies its effects on the body through the coordination of different rhythms; making adjustments in, and regulating, physiological responses in different ways [3]. Many studies have evaluated the effects of music on the vital signs of patients. For example, Emami et al. examined the effect of music on the vital signs of patients undergoing cardiac surgery. Their results showed that music improved vital signs in that population [4]. Another study in 2015 examined the effect of music on patients undergoing hemodialysis, with results of that study showing that the use of music in this group of patients was associated with positive effects [5].

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The results of previous studies on the use of music among neonates admitted to NICUs has also indicated the effectiveness of music in this group of patients. Tosun et al. examined the effects of music and compared it with some other methods used in neonates admitted to NICUs. The authors divided 80 preterm neonates into three groups of (1) music (2), aromatherapy and (3) vibration therapy. Their results showed that these methods were all effective in reducing the stress in neonates admitted to NICUs [6]. In another study, Arnon et al. concluded that the use of live music for neonates admitted to NICUs can improve the vital signs of this group [7].

One of the subjects that needs to be considered in the clinical application of music is the adaptation of the type of music to the person's culture and beliefs. The Holy Quran is the religious book of Islam. In Islamic and Iranian texts, the Quranic recitation is considered as a rhythmic and pleasant piece of music that can have positive effects [8]. However, studies on the application of the Quranic recitation are limited among neonates admitted to NICUs. Therefore, the purpose of this study is to investigate the effect of listening to the Holy Quran on the physiological responses of neonates admitted to NICUs.

2. Materials and methods

2.1. Study type, sample and sampling

The clinical trial was conducted on neonates admitted to NICUs in Karaj, Iran, in 2015. According to a study conducted by Shamsi et al., [9] the mean and standard deviation scores in the two groups of control and intervention were estimated to be 65.14 ± 3.57 and 65.21 ± 6.04 , respectively, using the sample size formula (32). Therefore, considering type I error, $\alpha = 0.05$ and the type II error, $\beta = 0.20$ (power = 80%), the sample size was calculated using the following formula.

$$n = \frac{(Z_1 + Z_2)^2 2S^2}{d^2}$$

$$n = \frac{(1.96 + 0.84)^2 2S^2}{0.7^2 S^2} = 32$$

The study used a sequential convenience sampling method. After selecting the samples, their random assignment into two groups was done using the cards in bags method by a nurse who was not aware of the study groups. Neonate physician, nurses and neonates' parents were blinded to study groups, as well.

2.2. Inclusion and exclusion criteria

The inclusion criteria were physiological stability over the past 24 h, appropriate birth weight according to gestational age, Apgar scores of 7 and more at the first and fifth minutes after birth, receiving breastfeeding or infant formula, lack of family history of deafness or mental retardation, and lack of underlying diseases.

The exclusion criteria were signs of stress during the intervention from the infant (such as severe reactions to audio stimulation during intervention with hiccups, abnormal movements in the mouth, squeezing the eyes, reversing the eyes, severe movements, uncontrollable crying, mottling, flashing and hypotony), abnormal physiological responses (such as decreased or increased heart rate [>200] apnea, decreased percentage of arterial oxygen saturation by less than 80% during the intervention), the need for any new medical or nursing intervention during the intervention, impaired level of consciousness during the study, digestive problems (such as necrotizing enterocolitis), becoming suddenly unwell, and the parents' unwillingness to continue to participate in the study.

2.3. Intervention

Before the neonates were connected to the monitor, they were placed in the nest in the supine position, and then headphones that were disinfected with alcohol were placed on their ears. It should be noted that in order to prevent the effects of headphones, headphones were placed on the ears of the neonates in both groups, but nothing was played for the control group. In the intervention group, the headphones were connected to an MP3 Player, and the voice of Quran was tuned to 45 db so that the surrounding noise was sufficiently covered while also ensuring that sound was kept at a safe level. All interventions were performed in the afternoon to avoid noise from morning routine activities such as visitations. The Holy Quran recitation, including verses 78 to the end of Al-Isra surah, was played in the intervention group. It should be pointed out that the Surah, verses and the voice of the Quran reciter were selected according to the views of a Quranic scholar. The reason for choosing verses 78 to the end of Al-Isra surah was due to the meaning of verse 81 of the surah: 'And we send down of the Quran that which is healing and mercy for the believers', and the continuity of meanings between the verses before and after the verse 78.

2.4. Measuring physiological symptoms (Primary outcomes)

In the present study, physiological responses including heart rate, respiratory rate, arterial oxygen saturation percentage, mean arterial pressure and temperature were recorded every 10 min in three stages: immediately before the intervention, during the intervention (minutes 10 and 20 from the onset of intervention) and 10 min after the intervention. This was done using standard monitoring devices. All measurements were performed by NICU nurses who were blinded to study groups. Nurses then reported the findings to the researchers who were in the nursing station and recorded them in designed forms.

2.5. Ethical considerations

Study was approved by Research Ethic Committee of University of Medical Sciences (Ethics code: 394470). Study was also

Table 1
Participants demographics characteristics.

Items	Intervention group(n = 32)	Control group(n = 32)	P value
Age (year)	29.3 ± 1.2	29.6 ± 1.4	0.36
Birth weight (g)	1370.9 ± 218.4	1434.5 ± 216.3	0.25
Apgar score at 1 min	7.7 ± 0.7	7.5 ± 0.7	0.45
Apgar score at 5 min	8.8 ± 0.6	8.7 ± 0.6	0.56
Delivery type			0.49
	Vaginal delivery	12	
	Caesarean section	20	
Gender			0.80
	Men	17	
	women	15	

registered in Iranian Registry of Clinical Trials (IRCT 20170620034653N3). Prior to conducting the study, the necessary coordination was made with the hospital director and relevant authorities. Prior to entering the neonates into the study, their parents were asked to complete a voluntary consent form. It should be noted that the goals and methods of the study were explained to the parents before obtaining consent.

2.6. Statistical analysis

SPSS V.16 software and descriptive and inferential statistics were used (independent *t*-test, Chi-square or Fisher's exact test, ANOVA with repeated observations). *P*-value less than 0.05 were considered significant in all tests.

3. Results

Two participants from the intervention group and two from the control group were excluded. The reason for all the exclusion was malfunctioning of measuring devices. Finally, 64 participants' information was analysed. Based on the independent *t*-test and Chi-square or Fisher's exact test, the underlying variables were similar in the two groups (Table 1).

3.1. Heart rate

According to independent *t*-test, there was no significant difference in the mean heart rate of the neonates before the intervention between the two groups ($P=0.11$). The results of ANOVA with repeated observations showed that during the intervention ($P<0.001$) and 10 min after the intervention ($P=0.028$), the mean heart rate of the neonates in the intervention group was significantly lower (Table 2).

3.2. Respiratory rate

The mean respiratory rate of neonates before ($P=0.18$) and 10 min after the intervention ($P=0.98$) was not significantly different between the two groups, while it was significantly less in the intervention group during the intervention ($P<0.001$) (Table 2).

3.3. Hemoglobin saturation by oxygen (o_2 sat)

The results indicated that the mean oxygen saturation percentage in neonates before the intervention was not significantly different between the two groups ($P=0.31$), while it was

significantly higher in the intervention group during ($P<0.001$) and 10 min after the intervention ($P=0.018$) (Table 2).

3.4. Blood pressure

The results of this study showed that the mean arterial pressure of neonates before ($P=0.48$) and during the intervention ($P=0.16$) was not significantly different between the two groups, while it was significantly less in the intervention group 10 min after the intervention ($P<0.01$) (Table 2).

3.5. Body temperature

According to the results, the mean body temperature of neonates before ($P=0.79$), during ($P=0.15$) and 10 min after the intervention ($P=0.41$) had no significant difference between the two groups (Table 2).

4. Discussion

In this study, the Quranic voice was used and its effects on the vital signs of the neonates admitted to NICUs were evaluated. Based on the findings of this study, listening to voice of Quran may be an effective technique to improve vital signs in neonates attending NICU.

The stressful environment of NICUs can cause serious complications for neonates admitted to these units. Changes in the vital signs can be one of these complications. The use of non-drug, inexpensive and available therapies in this regard can be very helpful due to the physiological vulnerability of neonates. One of these therapies is music, which has been frequently studied in previous research, where most studies have proven its positive effects. The Quranic voice or Quranic recitation is a form of music that is culturally entwined with the Islamic faith. Our findings appear to support other research which has found clinical improvements in neonates admitted to NICU from exposure to the Quranic recitation. Keshavarz et al. examined the effect of Quranic voice on the physiological responses of premature neonates admitted to NICUs [8]. In that study, the neonates were randomly divided into two groups. The physiological responses of neonates in the two groups were recorded 10 min before and 10 min after the intervention. Their results showed that in the Quranic voice group at the end of the intervention, the mean respiratory rate and heart rate decreased significantly and the arterial oxygen saturation increased significantly. The changes were even observed up to 10 min after the intervention [8]. In another similar study in 2012, Eskandari et al. examined the effect

Table 2

Mean of main measured items before and after intervention in both groups.

Items		Intervention group(n = 32)	Control group(n = 32)	Mean difference	Effect Size	P value
Heart rate	Before	146.5 ± 11.8	142.3 ± 9.2	4.3	0.39	0.11
	During	131.1 ± 13.4	147.7 ± 9.4	16.6	1.43	0.001
	After	137.7 ± 13.6	144.7 ± 10.8	7	0.57	0.028
O2 sat	Before	93.5 ± 3.1	94.2 ± 2.5	3.3	0.24	0.31
	During	95.7 ± 3.1	92.4 ± 2.6	3.3	1.15	0.001
	After	93.8 ± 2.4	92.2 ± 2.8	1.6	0.61	0.018
Respiratory rate	Before	51.7 ± 6.9	49.7 ± 4.9	2	0.33	0.18
	During	47.2 ± 7.4	53.6 ± 3.7	5.4	1.09	0.001
	After	53.1 ± 5.6	53.1 ± 3.5	0	0.00	0.98
Mean arterial pressure	Before	49.6 ± 16.4	47.3 ± 8.2	2.3	0.18	0.48
	During	49.8 ± 15.9	45.6 ± 6.4	4.2	0.34	0.16
	After	45.1 ± 6.4	42.3 ± 14.1	2.8	0.25	0.01
Temperature	Before	36.9 ± 0.60	36.1 ± 0.42	0.8	1.56	0.79
	During	36.3 ± 0.73	36.1 ± 0.43	0.2	0.35	0.15
	After	36.4 ± 0.79	36.2 ± 0.46	0.2	0.35	0.41

of listening to the Quranic voice on the physiological parameters of premature neonates in NICUs. They divided 120 preterm neonates in the NICU into four groups. The neonates in group one listened to the Quranic voice, in group two to music, and in group three to their mother's voice. Group four was the control group which did not listen to anything. The results of the study by Eskandari et al. showed that physiological changes after the intervention were better in the intervention group [10]. Although studies in NICUs are very limited, the effects of listening to the Quranic voice and its effect on vital signs among other patients have also been studied frequently and are highly suggestive of positive results. For example, in 2009, Mirbagher et al. examined the effects of listening to Quranic voices on the vital signs of patients undergoing surgery. Their results showed that listening to Quranic voices reduces the stress and anxiety of the patients, followed by the improved stability of vital signs [11].

Stability in vital signs can be due to the effect of listening to the Quranic voices in reducing the activity of the sympathetic system in the neonates. Reduced activity of the sympathetic system can lead to relaxation, reduced stress, slow breathing and a lower heart rate. Furthermore, listening to the Quranic voices can be a distraction factor that causes the neonates' thoughts to be distracted from more destructive hearing stimulations in the NICUs, which can in turn lead to increased relaxation and sustained physiological symptoms. There may also be specific effects related to the Holy Quran, which may have specific healing properties itself, with this capacity mentioned explicitly several times in its verses.

5. Limitations

One limitation of this study was a lack of other studies investigating similar research, which made it difficult for the researchers to compare and interpret their results to other settings. Furthermore, as an intrinsic element of the Islamic faith, Quranic voice may be only accepted by Muslims and this can potentially limit the generalization of the findings.

6. Conclusion

Humans respond instinctively to harmonious and rhythmic sound, and this response remains throughout life. Acquiring appropriate hearing stimulation for neonates admitted to NICUs is

essential. The stress caused by this can affect the vital signs of these neonates. The present study showed that Quranic voice could be effective in this regard. Due to the paucity of studies on this topic, it is recommended that further more detailed or larger studies be carried out. Based on the positive findings in this group, it is also recommended that the effect of listening to Quranic voices on other clinical factors, such as pain in painful procedures, as well as the effect of the Quranic voice over a longer period of time, should be studied.

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