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Effect of the Holy Quran on the Physiological Responses in Premature Infants: A Review

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Abstract

Background: One of the most important methods of complementary medicine is music and phonotherapy and one of the most beautiful sounds is the sound from the recitation of the Quran. We aimed to investigate the effect of the sound of the Quran on physiological responses in preterm infants.

Materials and Methods: All clinical trials evaluating the Effect of the Sound of the Holy Quran on the physiological responses in premature infants were searched in the online databases of Scopus, EMBASE, Cochrane, Web of Science and Medline with no language or time restrictions up to the end of Feb. 2019, using the combination related keywords of Mesh. Two reviewers did study selection.

Results: Five studies with a sample size of 360 were included in this review. In the first study, the mean of respiratory and heart rates significantly decreased and oxygen saturation levels increased in the Quran group compared to the control groups. In the second study, there was a significant difference in the oxygen saturation, respiratory rate, and heart rate between the two groups. In the third study, there was a significant difference in arterial blood oxygen levels and heart rates between the groups. In the fourth study, two groups (Quran recitation and control) were surveyed at minute 10 and 20 of intervention, also at minute_10 post intervention; there were significant differences in respiratory rates and oxygen saturation levels at the three time points. In the fifth study, results did not indicate any significant differences in the mean of responses in four groups (Quran recitation, lullaby music, silence, and control groups).

Conclusion

Listening to recitation of the Quran can improve physiological parameters (reduced heart and respiratory rates, and increased oxygen saturation level) in preterm infants.

Key Words: Physiological response, Premature Infants, Quran.

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1- INTRODUCTION

An infant's age at birth is an important determinant of the chances of normal survival and growth. Previous studies described a premature infant as having a birth weight of 2,500 g or less; however, today, infants are considered premature if they were born prior to 37 weeks from the first day of their mothers' last menstruation (1). Despite recent advances in prenatal and neonatal care over the past 40 years, premature birth statistics are still high. Preterm birth is a major cause of neonatal mortality and a major public health problem (2). The World Health Organization (WHO) defines preterm birth as any birth before 37 completed weeks of gestation, or fewer than 259 days since the first day of the woman's last menstrual period (3). According to the World Health Organization's annual report, 15 million annual births or 11% of all births worldwide are preterm, with nearly 90% of them reported in developing countries. Preterm births account for 10% of births in Iran, so, Iran is among the areas with a high prevalence of premature infants (2).

Today, with technological advancement, vulnerable infants are given a greater chance of survival, yet adequate physiological growth is not observed in many premature infants, and physiological problems are more prevalent in them than normal and full term infants. Fluctuations in body temperature, the presence of a flexible chest, lungs, and underdeveloped respiratory center cause premature infants to be unable to breathe effectively. As a result, periodic respiratory exacerbation, hypoventilation, and frequent and prolonged periods of apnea occur. Very low cardiac sphincter tonicity stimulates chemical and bradycardic receptors and increases the risk of aspiration. Consequently, premature infants are prone to many physiological disorders such as bradycardia, hypotension, cardiac and apnea disorders, respiratory, hearing, and visual problems (2). In the first week after birth, some neonatal intensive care unit (NICU) infants experience about 10 to 16 painful procedures per day (4). Pain affects the physiological and behavioral responses of the infant; pathogenic conditions such as acidosis, irregular breathing, and pneumothorax are associated with pain in infants in addition to therapeutic approaches (5). Therefore, it is important to relieve pain using both pharmacological and non-pharmacological methods. Given the importance of the subject in recent years, researchers have taken into consideration the use of non-pharmacological approaches to neonatal care and relief such as topical heat therapy (6), aroma therapy using breast milk (7), massage therapy (8), kangaroo mother care (skin-to-skin care) (9).

Although advanced medical care is vital for the survival of premature infants, supportive care is effective on the performance and structure of the brain, neurological development occurs through certain types of sensory stimuli (10). In contrast, the lack of appropriate stimuli has a negative impact on the physiological function and neurobehavioral development of the premature infant, increases the risk of physical injury, mental retardation, and abnormal development (11). Thus, infant studies focus primarily on medical care and then on supportive techniques such as reducing environmental stimuli, non-nutritive sucking, music and touch (12). Some studies have shown that the combination of pain, stress, and separation from parents, along with multiple environmental stimuli and caregivers, may have a negative impact on infant health and exert their effects through fluctuating heart rate and oxygen saturation levels, wide blood pressure fluctuations, and an increased restlessness in infants (13). In fact, although medical care is essential for the survival of premature infants, it is also associated with complications and may

cause chronic problems in premature infants in the end (14). Research has shown that music as a complementary care and natural and non-invasive stimulus can be used to achieve therapeutic and developmental goals in premature infants. It can also be a good alternative to disturbing environmental sounds (14). It has significant benefits including its effect on physiological responses and neurobehavioral development in premature infants (11,15, 16).

Therefore, complementary medicine techniques such as music therapy are not only helpful in painful procedures but also in improving the physiological index of healthy infants. One of the most beautiful sounds is the Quran recitation, with its unique order, which is considered as one of the most magnificent aspects of the Holy Quran. The letters of verses are arranged uniquely so that rhythmic and pleasant sounds having no rhyme, weight, orderly rhythm are heard when listening, without musical instruments. In addition, no text is as rhythmic and influential as the Holy Quran when read aloud (13). In our knowledge, there has been no study on the effect of the Quran recitation on the physiological responses of premature infants; therefore, the aim of this review was to identify the effect of the Holy Quran recitation on physiological responses in premature infants admitted to neonatal intensive care unit (NICU).

2- MATERIALS AND METHODS

2-1. Method

In this review, the following databases were searched for relevant papers and reports: Scopus, EMBASE, Cochrane, Web of Science and Medline (via PubMed) with no language or time restrictions (up to the end of Feb. 2019) using the combination keywords of (Infant OR Newborn OR, Neonate OR Premature Infant OR Infant, Premature OR Treatment OR Therapeutics OR Therapy OR Trauma OR Quran OR Holy Quran) AND (Physiological) AND (Responses), and their Persian synonyms and all their possible combinations, were searched in the national databases (Magiran, SID, and Iran.Doc).

2-2. Eligibility criteria

Participant: Premature infants admitted to NICU.
Interventions*:* The sound of recitation of the Holy Quran as a non-pharmacological intervention to improve physiological functions in newborns.
Comparators*:* Treatment vs. control group, treatment vs. different type of treatment, before vs. after treatment.
Outcome: Effect of the sound of the recitation of the Holy Quran on physiological responses (oxygen saturation, respiratory rate, and pulse).

2-3. Included and excluded studies

Randomized controlled trials (RCT), clinical studies both randomized and non-randomized either retrospective or prospective. Due to the limited number of published RCT in the literature, other types of clinical studies were included. Pilot, correlation, and case study design, preliminary and case report studies were not included due to limited sample size and higher risk of bias. Studies published in Persian and English up to the end of Feb. 2019. Articles with incomplete data and from other languages were excluded.

2-4. Selection process

The relevant studies were chosen independently by two reviewers, who initially reviewed the abstracts of searched articles and then downloaded their full text to review carefully. Finally, the articles that met the inclusion criteria were enrolled in the systematic review, whereby relevant references were also reviewed to find further studies. The review also involved articles acquired through hand

searching. Any disagreement was judged by a third reviewer.

3- RESULTS

Finally, five studies with a sample size of 360 were included in this review. The intervention of the Quran recitation in those five studies was conducted once per day with a duration of 10-25 minutes. The recited chapters included Al-Isra, Yusuf, Ar-Rahman, and Yasin. The intervention was provided through headphone with volume ranging from 45 to 65 dB. A study conducted by Majidipour et al. (17) provided intervention with a small speaker, headphone, and MP3, which were placed beside the neonate's head. Three studies (18-20) used MP3 and headphone, which was placed on neonate's ears. In a randomized control trial and double blind study Keshavars et al. in 2010, 120 premature infants were randomly assigned into two groups. Two groups were observed for physiological responses from 10 minutes before to 10 minutes after intervention. Results showed that the mean of respiratory and heart rates significantly decreased and oxygen saturation levels increased in the Quran group as compared to the base measurements, the changes continued for 10 minutes after the intervention ($p<0.001$). The mean change of three variables at the end of intervention and after 10 minutes was significantly different between the two groups ($p<0.001$) (13). In the study by Majidipour et al. (2018), the infants were randomly divided in two equal groups (n=28). A Quran recitation was started five minutes before blood sampling in the case group and it continued to play for another 20 minutes. There was a significant difference in the oxygen saturation, respiratory rate, and heart rate between the groups ($p<0.05$) (17). In the study by Qolizadeh et al. (2019), the study sample consisted of 64 preterm neonates admitted to the NICU (32 of whom were in the Quranic voice group that listened to the recitation of the Quran and 32 in the control group). There was a significant difference in arterial blood oxygen level and heart rate between the groups ($p<0.05$) (18). In Eskandari et al.'s study (2012) in a randomized controlled trial, two groups of premature infants were surveyed for short term physiological responses at minute 10 and 20 of intervention, also minute 10 post intervention. They reported significant differences in respiratory rates and oxygen saturation levels during the three time points, but a difference in heart rates was seen only at minute 10 post intervention between intervention and control group ($p<0.05$) (19). In Eskandar et al.'s study (2014), premature infants in the Neonatal Unit (NNU), were randomly assigned to experimental (holy Quran recitation, lullaby music and silence), and control groups. Repeated measures ANOVA and Friedman test did not indicate any significant differences in the mean of responses within any of the four groups during the course of study ($p>0.05$) (20).

4- DISCUSSION

The review aimed to identify the effect of the Sound of the Holy Quran on physiological responses in Premature Infants admitted in NICU. Four out of five studies reported significant difference in physiological responses between intervention and control group. Premature infants have a vulnerable nervous system because their brain and their central nervous system (CNS) have been developed in the extrauterine environment rather than the intrauterine environment during the third trimester of pregnancy. Considering these special conditions, premature infants should be admitted to NICU for a long time, which not only has little resemblance to the mother's uterus, but also exposes them to innumerable sensory stimuli caused by healthcare procedures. In other words, the underdeveloped CNS of premature infants is exposed to heterogeneous environmental

stimuli that are different from intrauterine mild sensory impulses, and sometimes outside of the tolerance of premature infants, leading to lower levels of tolerance to these sounds. Thus, the NICU environment (2) will affect the CNS development of premature infants. Hearing sensation is one of the first senses a baby develops in the womb, so that auditory responses are stabilized in the auditory cortex and brainstem by the 26-28-week gestation (20). Mother's voice, breathing, heartbeat, and intestinal sounds are among the first sounds the fetus hears in the womb. However, premature infants are deprived of this part of natural sounds due to premature birth (21). Since the early development of the auditory system in infants has been proved, many studies have investigated the effect of acoustic stimulation on premature infants. These studies showed that music as a complementary care and natural and non-invasive stimulus can be used to achieve therapeutic and developmental goals in NICI infants or premature infants at home. It is also a good alternative to disturbing environmental sounds and has significant benefits, including effects on physiological responses and neurobehavioral development in premature infants (13).

Previous studies have shown that favorable acoustic stimulation affects the oxygenation rate of premature infants by regulating respiratory rate and increasing oxygen saturation levels (11, 14-16). Aghajani et al. (2010) showed that pre-operative Quran recitation reduced anxiety and blood pressure preoperatively (22). In a study on effect of Quran recitation on the patients' stress level, Majidi et al. showed a decrease in respiratory and pulse rate in the Quran recitation group compared to the control group after the intervention (23). Music and rhythmic songs reduce the activity of the neuroendocrine and sympathetic nervous systems and allow the parasympathetic system to overcome the sympathetic nervous system, resulting in relaxation and sleep, decreased heart rate, regulation of deep breathing, muscle relaxation and induction of alpha waves that induce relaxation when the person is conscious. The neuroendocrine system is affected by music in three ways:

1. The secretion of endorphins from the pituitary gland, which relieves pain and affects mood and memory status.

2. Decreased secretion of catecholamines such as epinephrine and norepinephrine from the adrenal gland, which decrease heart rate, metabolism, blood pressure, free fatty acids, and oxygen consumption.

3. Decrease in adrenal corticosteroids released after stress.

Another mechanism underlying how music works is that music may distract the infant from distracting acoustic stimuli, thereby reducing infant stress responses. This response has been suggested as a tool to relax CNS and reduce stress responses. Considering the effect of the Quran recitation in changing oxygen saturation, respiratory rate, and heart rate of infants, it can be concluded that the Holy Quran recitation might reduce stress in infants considering the mechanism of decreasing sympathetic activity and increasing parasympathetic activity, secretion of catecholamines and endorphins (13).

5- CONCLUSION

Based on the results, listening to the recitation of the Quran can improve physiological parameters (including reducing heart rate, respiratory rate, and increasing oxygen saturation) in preterm infants in NICU. Therefore, listening to the recitation of the Quran can be suggested as a supportive care to help improve the physiological status of preterm infants.

6- CONFLICT OF INTEREST: None.

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