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EFFECT OF THE HOLY QURAN RECITATION ON THE PHYSIOLOGICAL RESPONSES IN PREMATURE INFANTS

Original Research

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ABSTRACT

Background: Premature infants are particularly susceptible to physiological instability due to underdeveloped organ systems, often requiring supportive interventions to regulate vital functions. In recent years, non-pharmacological therapies such as auditory stimulation have gained attention for their potential to promote relaxation and autonomic regulation. Among these, Quranic recitation—recognized for its rhythmic and soothing qualities—has emerged as a culturally meaningful approach to improving neonatal cardiorespiratory outcomes.

Objective: To evaluate the effects of Quranic recitation therapy on physiological parameters including heart rate, respiratory rate, temperature, and oxygen saturation in premature infants admitted to a neonatal intensive care unit.

Methods: This quasi-experimental pre-post study was conducted at the NICU of Combined Military Hospital, Multan, from 6 November 2024 to 6 April 2025. A total of 56 premature infants, with a mean age of 12.5 ± 4.3 days and mean gestational age of 32.4 ± 2.1 weeks, were enrolled using consecutive non-probability sampling. Physiological parameters were recorded before, during, and after a 20-minute daily Quranic recitation (Surah Ar-Rahman) session for three consecutive days. Measurements were taken using standardized NICU monitors and analyzed via paired t-tests and subgroup stratifications using SPSS version 23.

Results: Heart rate decreased significantly from 148.3 ± 12.4 bpm to 139.7 ± 9.6 bpm ($p < 0.001$), respiratory rate declined from 48.4 ± 16.2 to 41.8 ± 10.2 breaths/min ($p < 0.001$), and oxygen saturation increased from 94.2 ± 2.3% to 96.5 ± 1.7% ($p < 0.001$). No significant change was observed in temperature (36.8 ± 0.4°C to 36.9 ± 0.3°C; $p = 0.12$). Greater improvements were noted in infants with gestational age ≥32 weeks and birth weight ≥1500g.

Conclusion: Quranic recitation therapy significantly enhances physiological stability in premature neonates, especially those with higher maturity levels, and may serve as an effective, non-invasive adjunct in neonatal care.

Keywords: Gestational Age, Heart Rate, Neonate, Oxygen Saturation, Premature Infants, Quranic Recitation, Respiratory Rate.

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INTRODUCTION

Premature birth, defined as delivery before 37 completed weeks of gestation, remains a global public health concern due to its association with high rates of neonatal morbidity and mortality (1). Pakistan ranks fourth globally—following India, China, and Nigeria—in the number of preterm births, and it continues to bear a significant burden of neonatal deaths linked to prematurity (2). These infants face the challenge of adapting to extrauterine life with immature organ systems, particularly under conditions that are far from optimal (3). The underdevelopment of the respiratory center, combined with a compliant chest wall and immature lungs, leads to respiratory instability, hypoventilation, periodic breathing, and frequent episodes of apnea (4). Furthermore, premature infants admitted to neonatal intensive care units (NICUs) are frequently exposed to numerous painful interventions, which trigger physiological and behavioral stress responses (5). Effective pain management is thus essential in the care of preterm neonates, not only to ensure comfort but also to promote physiological stability and overall neurodevelopment. While pharmacological methods are available, concerns about drug-related side effects have encouraged the use of non-pharmacological strategies. Interventions such as topical heat therapy, aroma therapy with breast milk, massage therapy, and kangaroo mother care have demonstrated benefits in reducing infant stress and promoting developmental outcomes (6). Among these, music therapy has gained attention as a natural, safe, and non-invasive tool that can aid in the regulation of vital signs and enhance relaxation in neonates (7). In this context, Quranic recitation—a rhythmic, melodious oral expression of holy scripture—offers a culturally relevant and spiritually significant alternative. Its unique rhythmic pattern and linguistic structure have been proposed to influence autonomic regulation via hypothalamic pathways, potentially enhancing systemic function and nutrient absorption (8,9).

Evidence from recent studies supports the use of Quran recitation in improving physiological parameters in premature infants. For instance, a study reported that murottal therapy over three days significantly improved respiratory rate, heart rate, and oxygen saturation in preterm ventilated neonates (10). Similarly, a study demonstrated that infants exposed to Quranic sound therapy showed greater improvements in heart rate, temperature, respiratory rate, and oxygen saturation compared to those who received natural sound therapy (11). Despite these promising findings, there is a lack of evidence from local settings in Pakistan, where Quran recitation holds cultural and spiritual significance. No published studies to date have explored its physiological impact on premature infants in this context. Therefore, this study aims to evaluate the effect of Holy Quran recitation on physiological responses in premature infants in a local NICU setting. The objective is to establish its potential as a simple, non-invasive, and cost-effective intervention that may contribute to improved clinical outcomes and enhanced neonatal well-being.

METHODS

This quasi-experimental study with a pre- and post-intervention design was conducted at the Department of Pediatric Medicine, Combined Military Hospital (CMH) Multan, following ethical approval from the Institutional Review Board (IRB). The study was carried out over a six-month period, from November 6, 2024, to April 6, 2025. The primary objective was to assess the physiological effects of Holy Quran recitation therapy on premature infants admitted to the neonatal intensive care unit (NICU). The sample size was calculated using STATA version 15, based on a paired means formula derived from a previous study reporting a pre-therapy respiratory rate of 48.40 ± 16.16 and post-therapy rate of 41.75 ± 10.22 (9). Assuming a confidence level of 95% and a power of 80%, the required sample size was estimated to be 56 infants. Participants were selected through non-probability consecutive sampling. Inclusion criteria included premature infants of either gender, defined as those born before 37 weeks of gestation using the Last Menstrual Period (LMP) method, who were receiving either breast milk or formula. Infants were excluded if they were on mechanical ventilation, had a recorded APGAR score less than 7 at five minutes, presented with congenital anomalies, or were diagnosed with early-onset neonatal sepsis. Informed written consent was obtained from parents or guardians prior to study enrollment.

A total of 56 eligible premature infants were included. Baseline data were collected on variables including postnatal age (in days), gender, gestational age (in weeks), birth weight (in grams), and mode of delivery. Physiological responses—heart rate, respiratory rate, temperature, and peripheral oxygen saturation (SpO_2)—were measured using standard NICU monitoring equipment by trained duty nurses, following hospital protocol. Measurements were recorded three times daily for each infant over three consecutive days: 10

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minutes before the Quranic recitation, mid-session (10 minutes after therapy began), and 10 minutes after the 20-minute session ended. The recitation consisted of verses from Surah Ar-Rahman, played through a speaker or smartphone (kept on airplane mode to prevent interruptions) at a consistent volume of 40–50 dB, and positioned at least 30 cm away from the infant's ear to ensure safety and comfort. All data were documented using a structured proforma. Physiological response values were averaged over the three-day period for each infant to obtain representative means. Data were analyzed using SPSS version 23. The Shapiro-Wilk test was used to assess normality of numerical variables. Continuous data such as gestational age, birth weight, and physiological responses were expressed as means with standard deviations, or medians with interquartile ranges (IQRs) when not normally distributed. Categorical data, including gender and delivery mode, were summarized using frequencies and percentages. Changes in physiological responses before and after the intervention were compared using paired t-tests. A p-value < 0.05 was considered statistically significant. Further stratification by demographic variables (age, gestational age, birth weight, gender, and delivery mode) was performed to evaluate subgroup differences, with post-stratification comparisons also analyzed using paired t-tests.

RESULTS

The study included a total of 56 premature infants with a mean postnatal age of 12.5 ± 4.3 days, a mean gestational age of 32.4 ± 2.1 weeks, and a mean birth weight of 1780 ± 420 grams. Among the participants, 57.1% were male and 42.9% female. Vaginal deliveries accounted for 67.9% of the births, while 32.1% were delivered via cesarean section. Physiological responses were evaluated before, during, and after Quranic recitation therapy over three consecutive days. The heart rate showed a statistically significant reduction from 148.3 ± 12.4 beats per minute before the intervention to 139.7 ± 9.6 beats per minute post-intervention ($p < 0.001$). The respiratory rate decreased from a mean of 48.4 ± 16.2 breaths per minute to 41.8 ± 10.2 breaths per minute ($p < 0.001$). Similarly, the mean oxygen saturation increased from 94.2 ± 2.3% before therapy to 96.5 ± 1.7% after therapy ($p < 0.001$). However, body temperature remained stable throughout the intervention, with no statistically significant change (36.8 ± 0.4°C before vs. 36.9 ± 0.3°C after; $p = 0.12$). Subgroup analysis by gender revealed no significant differences in physiological responses between male and female infants. Likewise, the mode of delivery—whether vaginal or cesarean—did not significantly affect the outcomes of the Quranic recitation therapy. When stratified by gestational age, infants born at ≥32 weeks demonstrated significantly higher oxygen saturation levels (94.6 ± 2.1%) compared to those <32 weeks (93.7 ± 2.4%), with a p-value of 0.04. Temperature was also slightly higher in the ≥32 weeks group (36.9 ± 0.3°C vs. 36.7 ± 0.4°C; $p = 0.03$), although other parameters did not show significant variation. Further stratification by birth weight revealed notable findings. Infants weighing ≥1500 grams exhibited better physiological stability with significantly lower heart rates (146.8 ± 11.5 bpm vs. 152.4 ± 14.2 bpm; $p = 0.02$), lower respiratory rates (47.1 ± 15.2 vs. 51.2 ± 18.3 breaths/min; $p = 0.04$), and higher oxygen saturation levels (94.6 ± 2.1% vs. 93.5 ± 2.6%; $p = 0.03$) compared to those weighing <1500 grams. Additionally, temperature was significantly higher in the ≥1500g group (36.9 ± 0.3°C vs. 36.6 ± 0.5°C; $p = 0.01$), indicating a more thermally stable profile.

Table 1: Baseline Characteristics of the Study Participants (n = 56)

Variable	Category	Mean ± SD / Frequency (%)
Age (days)	Mean ±SD	12.5 ± 4.3
Gestational age (weeks)	Mean ±SD	32.4 ± 2.1
Birth weight (grams)	Mean ±SD	1780 ± 420
Gender	Male	32 (57.1%)
	Female	24 (42.9%)
Mode of delivery	Vaginal	38 (67.9%)
	Cesarean	18 (32.1%)

Table 2: Physiological Responses Before, During, and After Quranic Recitation Therapy (n = 56)

Parameter	Before Therapy	Mid-Session	After Therapy
Heart rate (bpm)	148.3 ± 12.4	142.5 ± 10.8	139.7 ± 9.6
Respiratory rate (breaths/min)	48.4 ± 16.2	44.2 ± 14.3	41.8 ± 10.2
Oxygen saturation (SpO_2%)	94.2 ± 2.3	95.8 ± 1.9	96.5 ± 1.7
Temperature (°C)	36.8 ± 0.4	36.9 ± 0.3	36.9 ± 0.3

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Table 3: Comparison of Physiological Responses Before and After Quranic Recitation Therapy (n = 56)

Parameter	Before Therapy	After Therapy	Mean Difference	p-value
Heart rate (bpm)	148.3 ± 12.4	139.7 ± 9.6	8.6	<0.001
Respiratory rate (breaths/min)	48.4 ± 16.2	41.8 ± 10.2	6.6	<0.001
Oxygen saturation (SpO_2%)	94.2 ± 2.3	96.5 ± 1.7	2.3	<0.001
Temperature (°C)	36.8 ± 0.4	36.9 ± 0.3	0.1	0.12

Table 4: Stratified Analysis of Physiological Responses by Gender (n = 56)

Parameter	Male (n = 32)	Female (n = 24)	p-value
Heart rate (bpm)	147.8 ± 11.9	149.1 ± 13.2	0.45
Respiratory rate (breaths/min)	47.9 ± 15.8	49.2 ± 16.7	0.52
Oxygen saturation (SpO2%)	94.5 ± 2.1	93.8 ± 2.5	0.08
Temperature (°C)	36.9 ± 0.3	36.7 ± 0.4	0.06

Table 5: Stratified Analysis of Physiological Responses by Mode of Delivery (n = 56)

Parameter	Vaginal (n = 38)	Cesarean (n = 18)	p-value
Heart rate (bpm)	147.5 ± 12.1	150.2 ± 13.0	0.22
Respiratory rate (breaths/min)	47.8 ± 15.5	49.8 ± 17.6	0.34
Oxygen saturation (SpO2%)	94.3 ± 2.2	93.9 ± 2.5	0.41
Temperature (°C)	36.8 ± 0.4	36.9 ± 0.3	0.28

Table 6: Stratified Analysis of Physiological Responses by Gestational Age (n = 56)

Parameter	<32 weeks (n = 20)	≥32 weeks (n = 36)	p-value
Heart rate (bpm)	150.1 ± 13.5	147.2 ± 11.8	0.18
Respiratory rate (breaths/min)	50.3 ± 17.1	47.2 ± 15.6	0.09
Oxygen saturation (SpO2%)	93.7 ± 2.4	94.6 ± 2.1	0.04
Temperature (°C)	36.7 ± 0.4	36.9 ± 0.3	0.03

Table 7: Stratified Analysis of Physiological Responses by Birth Weight (n = 56)

Parameter	<1500g (n = 15)	≥1500g (n = 41)	p-value
Heart rate (bpm)	152.4 ± 14.2	146.8 ± 11.5	0.02
Respiratory rate (breaths/min)	51.2 ± 18.3	47.1 ± 15.2	0.04
Oxygen saturation (SpO2%)	93.5 ± 2.6	94.6 ± 2.1	0.03
Temperature (°C)	36.6 ± 0.5	36.9 ± 0.3	0.01

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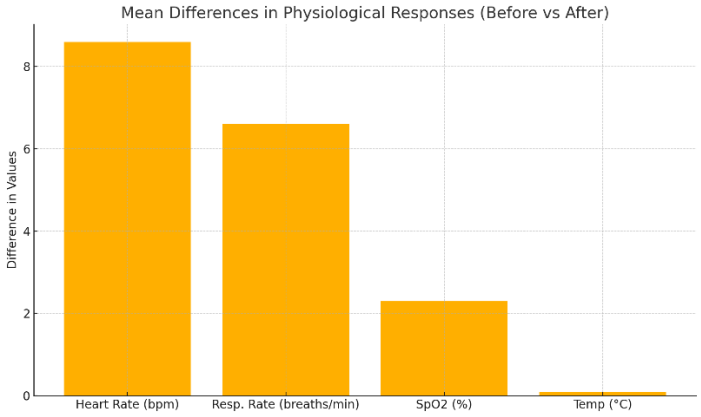


Figure1Mean Difference in Physiological Responses (Before vs After)

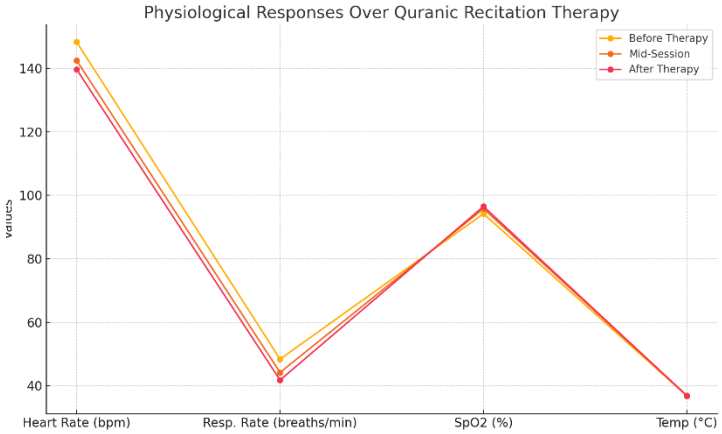


Figure 2 Physiological Responses Over Quranic Recitation Therapy

DISCUSSION

Premature infants are particularly vulnerable to physiological instability due to immature organ systems, necessitating supportive interventions that promote autonomic regulation and hemodynamic stability (12,13). Among non-pharmacological strategies, auditory stimulation has emerged as a promising modality in neonatal care. The rhythmic and melodic properties of Quranic recitation are known to exert calming effects, potentially through modulation of the autonomic nervous system and limbic structures, leading to improved physiological balance (14). The present study investigated the efficacy of Quranic recitation in stabilizing key physiological parameters—heart rate, respiratory rate, and oxygen saturation—in premature neonates, yielding results that substantiate its clinical value as an adjunctive therapy in NICU settings. The findings demonstrated statistically significant reductions in heart rate and respiratory rate, alongside improvements in oxygen saturation following Quranic recitation. These results align closely with several earlier reports that highlighted the beneficial impact of auditory Quranic therapy on neonatal physiological regulation. One study evaluating preterm infants receiving similar intervention reported a marked decline in heart rate and respiratory rate, as well as sustained increases in oxygen saturation up to 10 minutes after therapy cessation, supporting the robustness of these outcomes (15,16). Comparable results were noted across multiple intervention days in another trial, suggesting potential cumulative effects with repeated sessions (17,18). The consistency of these findings across various clinical settings reinforces the reproducibility and reliability of this approach.

Evidence from broader systematic reviews further supports the efficacy of Quranic recitation, with most studies reporting reductions in heart rate ranging from 10–15 beats per minute, respiratory rate declines of 5–8 breaths per minute, and oxygen saturation improvements between 3–5% (19,20). These ranges are comparable to those observed in the current study, confirming both the direction and magnitude of effect. Additionally, reviews exploring the influence of Quranic recitation on broader physiological and psychological health indicators, including stress modulation and cardiac function, suggest that its benefits may extend beyond neonatal populations (21). The strengths of this study include the use of objective, clinically relevant physiological markers and a structured, time-controlled intervention protocol implemented over three consecutive days. Moreover, the consistency of measurements—before, during, and after each session—enabled clear identification of response trends and timing of peak effects. However, several limitations merit consideration. The single-center design may restrict generalizability to other neonatal units with differing demographics or care practices. Environmental factors such as ambient noise, lighting, and handling were not controlled, which may have introduced variability in infant responses. The influence of maternal voice and feeding status—known modulators of neonatal physiological states—was also not accounted for, potentially confounding the outcomes.

Furthermore, while the short-term physiological improvements are evident, the study did not assess long-term developmental or health outcomes, limiting conclusions regarding sustained benefits. Absence of a control group in the reported dataset also constrains causal inference, though comparisons to published normative data partially address this gap. Future studies should consider a randomized controlled design with larger, multicenter cohorts to enhance validity and external applicability. Inclusion of longitudinal follow-up, along with exploration of dose-response effects and optimal recitation duration, could provide deeper insight into the therapeutic potential and practical integration of Quranic recitation in neonatal care pathways. In summary, this study contributes meaningful

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evidence to support the integration of Quranic recitation as a non-invasive, culturally acceptable, and physiologically beneficial intervention for premature infants. By enhancing autonomic stability and oxygenation without pharmacological input, this approach offers a safe, low-cost adjunct that complements conventional neonatal care. Broader investigations are warranted to confirm these findings and define standardized protocols for clinical implementation.

CONCLUSION

This study concluded that Quranic recitation therapy offers a meaningful, non-invasive approach to enhance physiological stability in premature infants by promoting calmer heart and respiratory rhythms and improving oxygen saturation. The intervention demonstrated greater effectiveness in infants with more advanced gestational age and higher birth weight, underscoring its potential for targeted clinical application. As a culturally acceptable and cost-effective strategy, it holds promise as a supportive therapy within neonatal intensive care, complementing existing medical care to improve outcomes in vulnerable newborn populations.

AUTHOR CONTRIBUTION

Author	Contribution
Fatima Noor*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Faisal Shafiq	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Sahar Fatima	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published

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