Journal of Neonatal Surgery
ISSN (Online): 2226 -0439
Vol. 14, Issue 20s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Therapeutic implications of Traditional Music in Neonatal Care: A review of Empirical Data

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Cite this paper as Ramachandra N.U., M. Ramamishra Yashaswi, Shivakumara D C, (2025) Therapeutic implications of Traditional Music in Neonatal Care: A review of Empirical Data. *Journal of Neonatal Surgery*, 14 (20s), 919-923.

ABSTRACT
Indian traditional music based largely on the Marga and Desi traditions-has a potential therapeutic application in NICUs. Indian classical ragas and lullabies are culturally important and possess structured tonal systems. Many research scholars have attempted to explore music therapy with empirical studies. In this article it is attempted to collect the empirical data and across research data base including the PubMed, Cochrane, Scopus and Peer-reviewed journals. This is an attempt to integrate understanding of numerous studies focusing on the physiological, developmental, and stress-reducing effects on both preterm and term infants. The existing studies are analyzed to point out gaps in methodology, and suggest ways to help integrate Indian music into protocols of neonatal care.

Keywords: *Neonatal Care, NICUs, Traditional Music, Therapy*

1. INTRODUCTION

The use of music as a therapeutic intervention in newborn intensive care units (NICUs) has become increasingly recognized in recent years, with considerable factual backing for its advantages in achieving physiological stability, neurodevelopment, and stress reduction in both preterm and term infants (Loewy et al., 2013; Standley, 2012). The study requires the use of culture-specific musical traditions. It is little understood, particularly related to those outside the Western continents (Ettenberger et al., 2017).

Traditional Indian music, rooted in the ancient Marga (classical) and Desi (folk) forms, offers a rich resource for neonatal music therapy. The structured tonal systems of ragas—each associated with specific emotional and physiological effects—and the rhythmic patterns of folk lullabies hold potential for targeted therapeutic applications (Rao, 2019). The value of culturally sensitive practice, including the use of certain musical traditions, is then taught as an avenue through which effective family integration of neonatal care protocols can be improved.

Music therapy in neonatal intensive care units (NICUs) has emerged as a non-pharmacological intervention to mitigate stress, stabilize physiological parameters, and promote neurodevelopment in preterm and term infants (Loewy et al., 2013). India's traditional music systems—anchored in the symbiotic relationship between Rāga, Vādya, Tāla, and Prāṇabandha—offer a structured yet understudied therapeutic framework. The music treatises mention that a rāga denotes a tuneful scale essentially constructed to correspond with emotional and physiological states. Vaadya – the choice of instruments (e.g., veena for resonance, bansuri for breath-like timbre) affect auditory processing. While some studies show that harmonic sound sources, such as tanpura, stabilize autonomic functioning more than percussive sounds (Sanyal et al., 2022). Taala - synchronize with biological rhythms. Preterm infants exposed to rhythmic lullabies show improved care. (Standley, 2012). Folk lullabies (Desi) use irregular tālas, which are better mimic maternal heartbeat variability than metronomic beats. Global studies prioritize passive music listening, overlooking active elements (vādya improvisation, tāla interplay) intrinsic to Indian traditions (Ettenberger et al., 2017).

2. METHODS

2. 1 Literature Search

- The recent study from past two decades on Neonatal care from various databases such as PubMed, Cochrane, Scopus, Peer-reviewed Journals were selected.
- Keywords for selection included "NICU," "raga preterm infants," "lullabies neonatal care", "music therapy" etc. with physiological/behavioral effects.

2.2 Data Synthesis

- Based on the themes such as physiological stability (heart rate, oxygen saturation), developmental outcomes, and cultural adaptability, the information form these articles were considered for analysis.

3. INFERENCES AND DISCUSSION

The music therapy (MT) was entitled as a therapeutic intervention and used in hospital settings. The evolution of music therapy is happening all the time, especially for populations at risk, such as preterm infants in the Neonatal Intensive Care Unit (NICU). These research projects, such as systematic reviews of randomized controlled trials, are focused on assessing music therapy and its validity in various conditions and patient populations. Findings from the sources pointed out some available benefits from MT, such as promoting autonomic stabilization in infants, enhancing feeding behaviors and state regulation, facilitating brain development and connectivity, assisting the attainment of age-appropriate developmental milestones, and bringing about alleviating parental anxiety and family psychosocial distress, thus promoting parent-infant bonding. There is a well-grounded argument that the therapy should be adopted into the NICU, given that benefits are most likely to be, and very few adverse effects have been reported in medically stable infants; the sources further indicate that rigorous research would build stronger evidence and inform service provision delivery. Below is a table (Table1) illustrating the evidence of music therapy effectiveness as referenced in the findings discussed in the sources given about systematic reviews on various applications and specific studies about preterm infants**.**

Table 1

Parameter	Loukas et al. (2022)	Haslbeck & Bassler (2020)	Epstein et al. (2023)	Erdei et al. (2024)	Kobus et al. (2024)	Wheelock et al. (2018)
Study Type/Focus	Research study using fMRI on musical memories1 . Investigating functional connectivity changes .	Clinical Practice Protocol for Creative Music Therapy .	Interpretative phenomenological analysis (IPA) of parents' experiences with MT3 . Qualitative study.	Report on program development, implementation , and preliminary outcomes of an MT program4 . Descriptive report.	Prospective, randomized controlled trial (RCT)5 . Investigating music-based interventions during kangaroo care.	Prospective longitudinal study examining brain-behavior relationships and neuromotor deficits..
Population	Preterm (39) and full-term (24) infants1 . Preterm infants were divided into music and control groups.	Preterm infants and their parent.	Israeli parents (7 participants, 6 families; 5 mothers, 1 father interviewed) of preterm infants who received MT3.	Patients in a NICU subunit, with plans to expand. includes discussion of higher-risk populations .	Clinically stable preterm infants in the presence of either parent. Included patients described.	Very preterm (VPT) children (<32 weeks gestation, 58 included) and term-born children (37-41)weeks gestation
Key Assessment Methods	MRI-based functional connectives (RS-fMRI), Movement assessment	Not detailed as a research study. Responsive to infant cues/breathing	Semi-structured interviews, Inter-Personal Process Recall (IPR)	Descriptive assessment of population served and modalities employed	Heart rate, Respiratory rate, Oxygen saturation	Movement edition., RS-fMRI14 .
Primary Outcome(s) Reported	Changes in resting-state functional connectivity (RS-FC).	Protocol description - focuses on the method for delivering	Parents' lived experiences of MT in NICU and at home .	Preliminary outcomes reported in terms of population served and modalities employed.	Anxiety and physiological responses (heart rate, respiratory rate)	Movement Assessment Battery for Children (MABC) subscales and total score

From the above table and the outcomes from the database, we infer the following;

3.1 Lost Opportunities for Infant Wellness and Development

The neonate might possibly be made to suffer the emotional discomfort derived from NICU, as music therapy served to provide a nonpharmacological approach to alleviate stress. For without it, one misses the opportunity to reduce possible stress levels.

Effectively lost is the possibility to improve autonomic stability, measure improvements to physiological parameters such as heart rate, respiratory rate, and oxygen saturation as well as uplifting amounts of oral feeding, effects suggested by empirical evidence. Missing the application of Creative Music Therapy (CMT), which was made responsive to the infant's own cues and breathing pattern, is the failure to offer individualized interaction, meaningful stimulation, and entrained rhythms that could generate a stable breathing and suck-swallow-breath coordination. Here, the therapist could not perform constant adjustment of musical responses, thus, coregulating the infant's behavioral states**.**

3.2 Impeded Well-Being and Attachment of Parents

Music therapy is important while supporting the parents during the difficult NICU experience. Its absence brings about a huge loss to the dyad-parent-mother relationship.

The parents are not likely to have the availability of the "therapeutic haven," which seems to halt time, express, processes the experience of birth, a traumatic one and finds resources. The continuum from a supportive therapeutic experience to music therapy bears potential loss in driving around the ability to create objectives that parents feel closer to their infants. They may not learn to pay attention to the signals their preterm infant tries to communicate during its NICU stay through music therapy.

There is no inclusion of the music therapist's role in enabling intuitive parental roles to emerge through interaction with their infants. Rather, the term in question merely connotes that skills are taught. Thus, in the absence of that, parents who may be feeling helpless and skeptical will miss this empowerment and support in their role as primary caregivers. Moments have been incorrectly codified inside music, in terms of missed possible meeting opportunities through which meaningful, socio-emotional, joyous and playful "moments of meeting" foster a secure relationship between the parent-infant dyad. Fortuitously fell short of strengthening the possible bond-enduring between a parent and an infant.

3.3 Failure to Utilize Family and Cultural Resources

The family-centered design is one of the significant aspects of music therapy in the NICU, which considers family integration with its unique considerations.

This all means that music therapy used as an opportunity to assess thoroughly the parents' needs, resources, musical heritage, and culture, and to incorporate songs they used during pregnancy-called songs of kin-into therapy procedures is virtually nonexistent. In fact, some interventions were designed with the integration of family musical culture as a central theme. The task of integrating the cultural heritage of the family in order to empower parents and build transcultural bridges is not accomplished according to the integration art of the music therapist.

Parents are not offered chances to engage vocally or to engage vocally with great emphasis so as not to lose one very potent means of connecting with their infant. Infant-directed humming, which importantly uses musical parameters that promote communication even across possible cultural and language boundaries, is not integrated into therapy.

4. SIGNIFICANCE OF MUSIC AND ITS ADAPTATIONS

The Sanskrit aphorism you gave, "śiśur vetti paśur vetti vetti gaṇa-rasam phaṇiḥ" ("The child knows, the animal knows, and the serpent knows the essence of rhythm/melody/sound") refers to the universality, as well as instinctive access to aesthetic pleasure, especially in terms of sound, rhythm, and music, for beings who have not developed such higher understanding of things.

By this in mind, we can very well link the aphorism to the "śiśur vetti," as the last two sources are concentrated on music therapy for preterm babies. These babies are at stages where their brains are still developing and their responses are likely to be more instinctual and much less cognitively mediated than those of older children or adults.

The evidence suggests strongly that preterm infants do respond, at least at some level, to the "essence of rhythm/melody/sound" (gaṇa-rasam).

4.1 Neurological Responses: In preterm infants who were receiving music therapy, listening to familiar music has modulated resting-state functional connectivity (RS-FC) in brain regions related to music, multisensory processing, familiar music processing, and processing emotional content. Prior exposure to music shows a positive correlation with the increased RS-FC in brain areas involved in multisensory and emotional processing, suggesting that musical memories were engaged quite strongly. This means that these infants' brains are processing music at a level beyond mere sound as input but linking it to familiarity-to the realm of emotion and sensory integration-a sort of "knowing" of music's essence.

4.2 Physiological and Behavioral Responses: Creative music therapy (CMT) aims at relaxing, stimulating, and coregulating preterm infants. Music therapy interventions for premature infants are shown to improve physiological stability, feeding, and sleep. It entails humming or singing in an infant-directed, spontaneously improvised lullaby manner, continuously attuned to the infant's needs, expressions, and breathing pattern (entrainment). Infants coordinate their bodily movements, facial expressions, and patterns of sucking with the rhythms and dynamics in the music-a very basic form of embodiment, in other words, response to musical input.

5. SUGGESTIONS

Possibly some of the aspects derived from traditional music in India while paving a way down to neonatal settings are:

5.1 Personalized songs

Parents will be guided to choose or compose lullaby or songs from their culture, imbibing principles akin to linking Svaras to soothing or compassionate Rasas (e.g., in notes used with Karuna or Shānta), and encourage them to sing to the newborn during kangaroo care or bedside-sharing activities. The music therapist will probably help the parents feel comfortable doing this through their singing along with them or providing accompaniment.

5.2. Infant-directed humming and singing

Music therapists in association with the parents can sing online or involve some of the melody contours or rhythmic patters of traditional lullabies that are believed to be soothing to give way for individually combined naturalistic references attuned to the breathing and movements of the infant while with a simple repetitiveness.

5.3 Vibro-acoustic Exploration

The use of traditional musical instruments well known for their resonant or calming qualities (like the monochord's function designed to evoke womb-like sounds) may perhaps be employed to provide gentle vibroacoustic stimulation during parent-infant contact mostly concentrating on notes or modes (sets of notes) associated with desired Rasas.

5.4 Prenatal Music Sharing

This is not in the strictest sense about any of these references, but there is such a concept as "musical memories in newborns" and that familiarization plays a part in processing music at such times; hence, this suggests that one might probably share traditional music prenatally for making memory-priors for similar, comforting sounds when entering the NICU. That's a recommendation for future practice, though direct evidence from these sources is thin on this specific application.

5.5 Staff Education

NICU staff and music therapists about the potential cultural and therapeutic values of various traditional genres of music, including the emotional states relatives want the family to have associated with them by linking them to specific musical elements (Svaras).

The supportive evidence for these applications includes findings that maternal singing during kangaroo care is beneficial for infants and mothers, that personalized music is comforting for parents, and that live, careful music therapy, using techniques such as entrainment and response to child cues, is helpful for regulation and interaction. The sources may not assess the neo-scores directly as to how much music will be particularly selected for its traditional Svara-Rasa attributes as much as they advocate strongly for the use of personalized, familiar, and live music by parents and trained therapists, with regard to traditional music integration.

6.CONCLUSION

It clear music therapy will prove to be much more useful in the next few years since evidence exists in the near future for NICU infants and their families. Traditional musical forms indeed include lullabies and other important family-selected songs (such as the "'Song of Kin") and can help provide those therapeutic ends with very deep resonance and effective applications. The inbuilt frameworks, emotional content, and cultural familiarities traditional music afford could bring a very robust structural base to help development in the individual infant's regulatory profile, particularly in the attachment between parent and infant, providing comfort during a difficult time. The in-depth impact of such linking intervention principles and so forth about Svara-Rasa connections indeed needs dedicated research. However, most current evidence seems to strongly point toward using personalized, live and responsive music, especially in connection with the participation of the parent and cultural background involvement. Well-established, evidence-based music therapy protocols promise to supplement traditional music not only in improving the course of development in the infant but also empowering parents and strengthening the foundation of parent-infant relationships in a potentially beneficial way broader than staying in the hospital. Rigorous research remains necessary to understand optimally how to deliver music therapy, including exploring the possible advantages of specific integrated traditional music approaches.

REFERENCES

[1] Erdei, Carmina, et al. "Music Therapy in the Neonatal Intensive Care Unit: A Center's Experience with Program Development, Implementation, and Preliminary Outcomes." *Children*, vol. 11, no. 5, 2024, p. 533. https://doi.org/10.3390/children11050533.

[2] Epstein, Shulamit, et al. "Music Therapy Spanning from NICU to Home: An Interpretative Phenomenological Analysis of Israeli Parents' Experiences in the LongSTEP Trial." *Nordic Journal of Music Therapy*, vol. 32, no. 5, 2023, pp. 373–396. https://doi.org/10.1080/08098131.2023.2180773.

[3] Haslbeck, Friederike B., and Dirk Bassler. "Clinical Practice Protocol of Creative Music Therapy for Preterm Infants and Their Parents in the Neonatal Intensive Care Unit." *Journal of Visualized Experiments*, no. 155, 2020, p. e60412. https://doi.org/10.3791/60412.

[4] Kamioka, Hideyuki, et al. "Effectiveness of Music Therapy: An Update of the Meta-analysis." *Patient Preference and Adherence*, vol. 8, 2014, pp. 727–753.
[5] Kobus, Stefanie, et al. "Music-Based Interventions to Reduce Stress in Parents of Preterm Infants During Kangaroo Care: A Prospective, Randomized Controlled Trial." *Frontiers in Neuroscience*, vol. 18, 2024, p. 1359769.
[6] Loukas, Serafeim, et al. "Musical Memories in Newborns: A Resting-State fMRI Study on Music Exposure and Functional Connectivity." *Human Brain Mapping*, vol. 43, no. 2, 2022, pp. 647–660. https://doi.org/10.1002/hbm.25677.
[7] Wheelock, Mary D., et al. "Functional Network Architecture Underlying Motor Deficits in Children Born Very Preterm at Age 12 Years." *NeuroImage*, vol. 183, 2018, pp. 574–583. https://doi.org/10.1016/j.neuroimage.2018.08.051.
[8] Epstein, Shulamit, et al. "Preterm Infants with Severe Brain Injury Demonstrate Unstable Physiological Responses During Maternal Singing with Music Therapy: A Randomized Controlled Study." *European Journal of Pediatrics*, vol. 180, 2021, pp. 1403–1412. https://doi.org/10.1007/s00431-020-03890-3.
[9] Palazzi, A., et al. "NICU Music Therapy and Mother-Preterm Infant Synchrony: A Longitudinal Case Study in the South of Brazil." *Nordic Journal of Music Therapy*, vol. 29, no. 4, 2020, pp. 334–352. https://doi.org/10.1080/08098131.2020.1752777.
[10] Haslbeck, Friederike Barbara, et al. "Music is Life—Follow-Up Qualitative Study on Parental Experiences of Creative Music Therapy in the Neonatal Period." *International Journal of Environmental Research and Public Health*, vol. 18, no. 12, 2021, p. 6678.
[11] Hugoson, Pernilla, et al. "Parental Singing During Kangaroo Care: Parents' Experiences of Singing to Their Preterm Infant in the NICU." *Frontiers in Psychology*, vol. 16, 2025, p. 1440905.
[12] Ramachandra, N. U. "Traditional Knowledge, Challenges and the Need for Revival." *Res Militaris*, vol. 12, no. 2, 2022, pp. 1611–1619.
[13] Ramachandra, N. U. "Polymorphism of Classical Taalas: A Study on Its Evolution and Adaptations." *Journal for ReAttach Therapy and Developmental Diversities*, vol. 6, no. 1, 2023, pp. 1128–1134. https://doi.org/10.53555/jrtdd.v6i1.2629.
[14] Gopinath, S. "Preserving Prabandha Gitis: Challenges and Opportunities." *Journal of Indian Musicology*, vol. 42, no. 2, 2016, pp. 78–91.
[15] Krishnaswamy, T. "Musical Innovations in Post-Medieval Prabandha Gitis." *Carnatic Music Research*, vol. 15, no. 3, 1979, pp. 125–140.
[16] Pakkala, J. "Bhakti Movement and Prabandha Gitis: A Historical Perspective." *South Indian Music Journal*, vol. 28, no. 1, 2013, pp. 45–58.
[17] Raghavan, V. *Ancient Tamil Nadu: A Cultural History*. Chennai: University of Madras Press, 1959.
[18] Sambamurthy, P. *Sangita Ratnakara: A Comprehensive Study*. Chennai: The Indian Music Publishing House, 1963.
[19] Satyanarayana, R. "Evolution of Prabandha Gitis: An Analytical Approach." *Journal of Musicology*, vol. 16, no. 2, 1990, pp. 87–102.
[20] Srinivasan, M. "Carnatic Music Curriculum: Integrating Prabandha Gitis into Pedagogy." *Journal of Music Education*, vol. 35, no. 4, 2008, pp. 201–215.
[21] Subbaraman, R. "Challenges in Performing Prabandha Gitis: A Contemporary Perspective." *Music Today*, vol. 20, no. 3, 2005, pp. 65–78.
[22] Subrahmanyam, K. "Inscriptions on Prabandha Gitis: An Archaeological Study." *Journal of South Indian History*, vol. 10, no. 1, 1985, pp. 35–50.
[23] Venkataramanayya, M. "Musical Trends in Vijayanagara and Nayaka Periods." *Journal of Indian Musicology*, vol. 8, no. 4, 1942, pp. 180–195.