IJBPAS, September, 2024, 13(9): 4247-4265

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

EFFECTS OF LIVE SINGING AND TACTILE STIMULATION ON THE NEONATES OF INTENSIVE CARE UNIT: VIDEO ANALYSIS AND PERSPECTIVE OF INTER-DISCIPLINARY TEAM OF NEONATAL INTENSIVE CARE UNIT

KHAWSAR J[1], RAMESH B[2*], KARTHIKEYAN K[3] AND MUKHERJEE B[4]

1: Research scholar, School of Music Therapy, Institute of Salutogenesis and Complementary Medicine, Sri Balaji Vidyapeeth, (deemed to be university), Puducherry-607403, India

2: Assistant professor, School of Music Therapy, Institute of Salutogenesis and Complementary Medicine, 1st floor, I- Block, Sri Balaji Vidyapeeth, Pondicherry-Cuddalore Main Road, Pillaiyarkuppam, Puducherry-607403, India

3: Professor, Department of Pediatrics, Ground floor, hospital building, Sri Balaji Vidyapeeth, Pondicherry-Cuddalore Main Road, Pillaiyarkuppam, Puducherry-607403, India

4: Faculty, School of Music Therapy, Institute of Salutogenesis and Complementary Medicine, Sri Balaji Vidyapeeth, Pondicherry-Cuddalore Main Road, Pillaiyarkuppam, Puducherry-607403, India

***Corresponding Author: Ms. Bhuvaneswari Ramesh: E Mail: bhuvaneswarir@mgmcri.ac.in**

Received 18th July 2023; Revised 20th Sept. 2023; Accepted 1st Dec. 2023; Available online 1st Sept. 2024

https://doi.org/10.31032/IJBPAS/2024/13.9.8291

ABSTRACT

Background: Music therapy, a non-invasive intervention, has shown promise in enhancing the well-being of neonates by regulating vital signs, reducing stress, and promoting emotional balance, making it a potential complementary approach for neonatal care.

Objectives: To assess the impact of music therapy with tactile stimulation for neonates in NICU during non-invasive procedure and to analyze the perspective of interdisciplinary team about the use and efficacy of music therapy on neonates in NICU.

Methodology: This randomized controlled trial included 60 neonates, divided equally into intervention and control groups. The intervention group received standard medical treatment combined with music therapy

and tactile stimulation during non-invasive procedures for four consecutive days, while the control group received standard medication alone. Neonatal behavioral states were recorded via video analysis. Additionally, a semi-structured interview was conducted with the NICU interdisciplinary team to gather perspectives on the efficacy of music therapy.

Result: Video analysis revealed significant differences between the intervention and control groups in the regulation of vital signs (HR, RR, SPO2), crying episodes, and neonatal relaxation states. The semi-structured interviews provided valuable insights from the interdisciplinary NICU team, highlighting the positive perspective and efficacy of music therapy in enhancing neonatal care.

Conclusion: In conclusion, this randomized controlled trial demonstrates the favorable impacts of music therapy with tactile stimulation on neonatal well-being during non-invasive procedures. The study underscores the potential of this intervention in regulating vital signs, reducing distress, and enhancing relaxation. The interdisciplinary team's positive perspective further supports the integration of music therapy as a valuable addition to neonatal care practices.

Keywords: Neonates, music therapy, tactile stimulation, NICU, behavioral state, randomized controlled trial, interdisciplinary team

INTRODUCTION:

The Neonatal Intensive Care Unit (NICU) is a highly specialized medical facility that offers essential medical care to premature infants and critically ill newborns who are at high risk, boasting advanced medical technologies and a committed team of healthcare professionals. Preterm birth, a global health concern, necessitates immediate and specialized care due to its associated medical complexities **[1-3]**.

Music therapy, an innovative approach rooted in the universality of music, has shown potential in enhancing care for preterm infants and critically ill newborns **[4]**. Music's impact on emotional and cognitive responses, stress reduction, and neural activation is well-documented **[5]**. Music therapy has been explored in NICUs, demonstrating benefits such as stress reduction and improved vital signs **[6-9]**. However, its implementation remains an ongoing area of investigation, particularly within the Indian context **[10-13]**. This study focuses on the impact of live singing and tactile stimulation as music therapy for neonates in the NICU, an area with limited research, and aims to assess its effectiveness in managing behavioral state of neonates during non-invasive procedures, the study also seeks insights from the inter-disciplinary team to comprehend music therapy's broader impact. By exploring these aspects, the study contributes to the

understanding of music therapy's role in improving the care and well-being of neonates in NICU, potentially guiding clinical practices and inspiring further research in this domain.

MATERIALS AND METHODS:

This is a randomized clinical trial with an interventional study design. The study was conducted in a tertiary hospital in Puducherry, India and included all the neonates in level II NICU who met the inclusion and exclusion criteria, from February to July 2023. Inclusion criteria includes: all neonates in NICU (preterm infants with 25+0 weeks to 37 gestational weeks and term neonates), neonates that have not been exposed to music prior to the intervention by the therapist, consent obtained by the caretaker where in exclusion criteria includes: neonates with sedative medicine and clinically unstable or opined by treating physician. Total 60 neonates were randomly assigned in intervention (30 neonates) and control group (30 neonates). The study protocol was approved by the Institutional Human Ethical Committee

(MGMCRI/2023/IRC/49/01/IHEC/27.)

Neonates from the intervention group (A) received standard medical treatment with music therapy intervention and the control group neonates (B) got standard medical treatment alone.

Mother's preferred lullabies were compiled and performed live with continuous gentle humming or singing accompanied by tactile stimulation for four consecutive mornings. The sessions lasted for 10 minutes each and were conducted during non-invasive procedures. A professional medical music therapist administered the sessions for Group A neonates. The therapist maintained controlled volume while humming or singing and sound level was maintained between 65 dB. Therapist used mother's preferred regional Tamil and Hindi lullabies and 2 English lullabies. Tactile stimulation took the form of gentle shoulder stroking, forehead stroking, soft hand tapping, or hand-holding.

During a four-day period of non-invasive procedures, neonates from Group B were observed for 10 minutes each day. Throughout the sessions, neonates in both groups remained in a silent NICU environment with no physical manipulation. The observation process utilized a camera focused on the neonates and a monitoring system that displayed continuous vital signs such as heart rate (HR), oxygen saturation (SPO2), and respiratory rate (RR). Video recording was taken under consideration to observe the changes of their vital signs (HR, RR, and SPO2), changes in their responses and behavioral state. Video recordings were

meticulously reviewed by a sole researcher who manually documented pre and post 10-minute measurements of heart rate, SPO2, respiratory rate, and behavioral state. Video analysis data was reviewed and validated by the other experts in music therapy field.

To gather insights from the interdisciplinary NICU team regarding their views on music therapy, a set of open-ended, semi-structured interview questions related to music therapy within the NICU context was formulated. These questions were designed to ensure the quality and reliability of data collection. To enhance their robustness, the questions were reviewed and validated by additional music therapy professionals before implementation. The study engaged participants from the NICU's interdisciplinary team, consisting of essential specialists in newborn care. Three members were selected for semi-structured interviews, allowing them to openly discuss their perspectives and personal experiences with music therapy. These participants encompassed an assistant professor of pediatrics (participant 1), a nurse (participant 2), and a postgraduate trainee (participant 3), providing diverse insights into how music therapy is perceived and utilized within the NICU team.

The interviews were centered on an open-ended questionnaire exploring music therapy's role in the NICU. The semi-structured approach encouraged flexibility and detailed responses. Following the interviews, the researcher transcribed the discussions to accurately capture participants' expressions and sentiments. The data collected underwent qualitative analysis, specifically theme analysis, to reveal recurring themes and patterns. This methodology facilitated a comprehensive comprehension of participants' viewpoints and experiences with music therapy in the NICU.

RESULTS:

Video analysis:

The video analysis exhibited significant differences between the music therapy intervention group and the control group neonates. The utilization of soothing lullabies, coupled with tactile stimulation, notably influenced neonatal vital signs and emotional states. The intervention group neonates displayed relaxation responses, experiencing a serene and secure atmosphere due to the calming lullabies. Consequently, distress and agitation decreased, reflecting improved emotional well-being. Moreover, music therapy interventions led to a reduction in crying episodes. The combined effects of lullabies and tactile stimulation provided a distraction from discomfort, fostering a calmer environment for both neonates and

caregivers. Sleep quality also improved, as the rhythmic lullabies facilitated easier sleep induction, crucial for neonatal recovery and growth.

Photo 1: Pt. 1 pre MT intervention

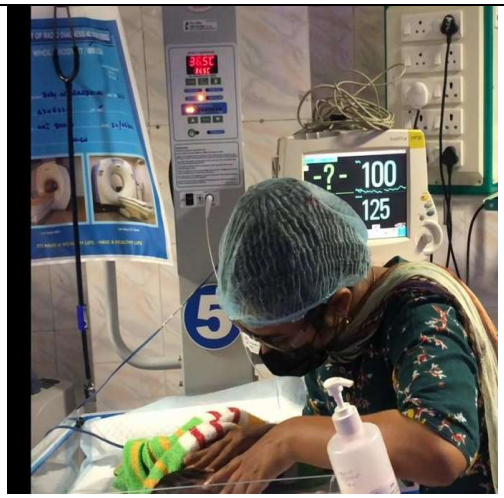

Photo 2: Pt. 2 post MT intervention

Photo 3: Pt. 2 pre MT intervention

Photo 4: Pt. 2 post MT intervention

Photo 5: Pt. 3 pre MT intervention. (Crying loudly)

Photo 6: Pt. 3 post MT intervention

Photo 7: Pt. 4 pre control intervention

Photo 8: Pt. 4 post control intervention

Photo 9: Pt. 5 pre control intervention

Photo 10: Pt. 5 post control intervention

Photo 11: Pt. 6 pre control intervention

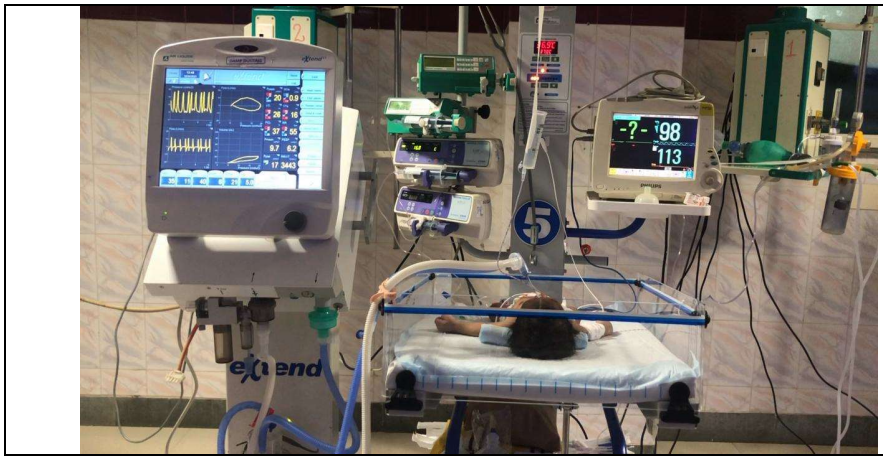

Photo 12: Pt. 6 post control intervention

Photo 13: Pt. 7 pre control intervention

Photo 14: Pt. 7 post control intervention

Photo 15: Pt. 8 pre control intervention

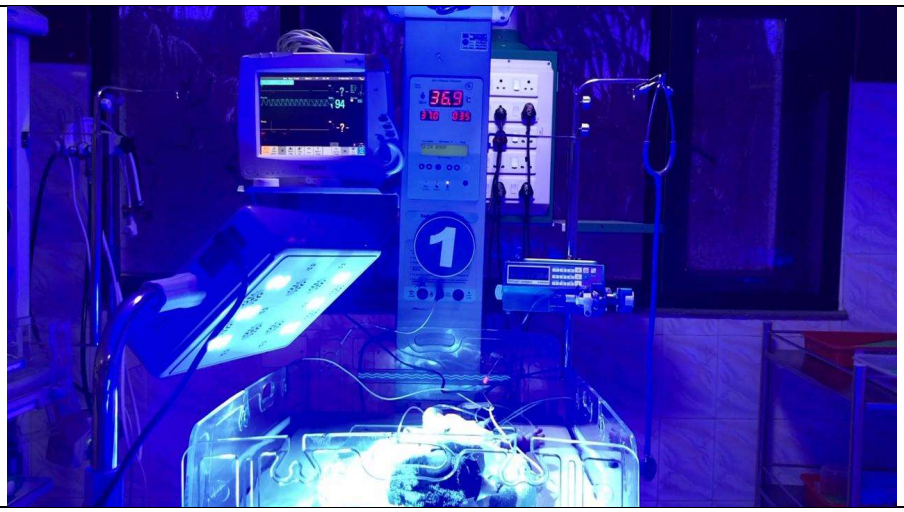

Photo 16: Pt. 8 post control intervention

Physiologically, music therapy positively impacted neonatal parameters. Heart rate, oxygen saturation, and respiratory rate were observed to stabilize in response to interventions. Music's calming influence contributed to balanced vital signs, indicating improved physiological stability in neonates. In summary, this video analysis underscores the transformative impact of music therapy on neonatal well-being within the NICU, enhancing emotional states, reducing distress, improving sleep, and stabilizing vital signs.

Semi-structured interview:

Following the interviews, the researcher transcribed the replies in order to record the actual words and emotions of the participants. The data collected during the interviews was then carefully analyzed utilizing qualitative data analysis techniques such as theme analysis. The researcher found themes and patterns in the replies, allowing him to acquire a full picture of the participants' perspectives and experiences with music therapy in the NICU.

Table 1: Codes, encoded responses and categories

Codes	Encoded responses	Categories
Prior concept of Music therapy.	**Participant1: Knew before but witnessed for the first time.** **Participant 2: Didn't have clear idea, experienced for the first time.** **Participant 3: Never knew about MT, pleasantly surprised after first experience.**	• **Discovery of music therapy.** • **Positive impression.** **Effectiveness of music therapy.** **Prior awareness of music therapy.**
2. Effects of MT observed on neonates.	**Participant 1: Reduced excessive cry, irritability and helps to sooth the neonates.**	• **Calming and soothing effect.**

	Participant 2: Reduces pain perception during IV-line insertion and blood sampling, increases relaxing state and increases sleeping quality. **Participant 3: Mother's preferred songs were helpful to increase sleep quality, mother was handling neonate much better way.**	• **Pain relief.** • **Sleep induction.** • **Impact on mothers.**
Adverse effect of MT on neonates	**Participant 1: From last few months never observed like that.** **Participant 2: never seen negative effects, only positive outcomes have observed.** **Participant 3: Have not observed negative effects. Womb sound, ocean drums sound also helps to comfort neonates.**	• **Absence of adverse effects.** • **Positive outcomes.** **Varied and diverse approach.**
Positive effects on overall NICU environment	**Participant 1: Stress reduction for NICU staff and parents.** **Participant 2: With neonates NICU staffs and KMC giving mothers also feels relaxed.** **Participant 3: Creates happy atmosphere in overall NICU area. Everyone works happily.**	• **Stress reduction for staff.** • **Positive impact on family members.** **Enhancing overall environment.** **Improved work and interaction.**
5. Recommendation as complementary therapy in NICU	**Participant 1: Obviously I will recommend as it helps for recover of neonates.** **Participant 2: For sure! When you touch and sing neonates stop crying and feels safe as they are with their mother.** **Participant 3: Definitely. Every patient deserves soothing effect so along with NICU I recommend music therapy in every ICU setup.**	• **Effectiveness in calming and comforting.** **Universality of recommendation.** **Potential for enhancing recovery.**
6. Future research scopes	**Participant 1: optimum duration of music therapy for therapeutic effect.** **Participant 2: Musical recommendation for preterm and term neonates.** **Participant 3: Music therapy for neonates with parenteral nutrition.**	• **Optimal duration of music therapy.** **Relevance for preterm and term neonates.** • **Music therapy and parental**
7. Scope in India	**Participant 1: Incorporating Indian classical music for**	**Rich cultural heritage in India.**

	neonates might have a wide scope. **Participant 2: In government hospitals can be included.** **Participant 3: During Kangaroo mother care (KMC) can be incorporated and MT can be alternative of phones for parents in NICU**	• **Potential for government hospitals.** **Application during Kangaroo Mother Care (KMC).** **Alternative to phone in NICU.**

DISCUSSION:

This current study aimed to assess the impacts of music therapy with tactile stimulation for the neonates in NICU in managing behavioral state during non-invasive procedure and to assess the perspective of inter-disciplinary team about music therapy with tactile stimulation for neonates in NICU. The video analysis of music therapy interventions in the NICU highlights the importance of incorporating mothers' preferred lullabies and tactile stimulation into the therapeutic strategy. This personalized approach demonstrated exceptional benefits for neonates, including regulation of vital signs, reduced irritability and crying episodes, improved sleep patterns, and relaxation. The combination of singing or humming with tactile stimulation heightens neonates' sensory perception, fostering serenity and contentment. The personalized nature of this approach, along with its ability to regulate vital signs, diminish irritability, enhance sleep, and induce relaxation, solidifies music therapy's status as a valuable and evidence-based complementary therapy in neonatal care. This evidence supports the incorporation of music therapy into standard neonatal care protocols, enriching the NICU environment, and contributing to the positive outcomes of premature and critically ill neonates. Haslbeck FB **[14]** reported from the video analysis of 18 premature infants and their parents that creative music therapy might be helpful to reveal their inherent capacity for musical expression, which thereafter has the potential to enhance self-regulation and personal growth.

Through semi-structured interview analysis seven prominent themes regarding the integration of music therapy into neonatal care in the NICU setting came. These themes, encompassing prior perceptions of music therapy, observed effects on neonates, absence of adverse impacts, enhancement of the NICU environment, endorsement as a complementary therapy, prospects for future research, and potential within the Indian context, collectively highlight the profound

implications of music therapy for the well-being of these vulnerable infants.

- **Prior Concept of Music Therapy and awareness**

The study accentuates the limited prior understanding of music therapy among the NICU's healthcare professionals. This underscores the need to disseminate knowledge about music therapy's merits, given that conventional medical practices often overshadow alternative therapies. Raising awareness among medical teams through education and training can foster acceptance and integration of music therapy, allowing for its holistic benefits to be embraced in neonatal care. In a study authors found that parents of special children's had some prior awareness of music therapy **[15]**.

- **Observed Effects on Neonates**

The observed impacts of music therapy interventions on neonates are substantial. The emotional and physiological benefits, such as regulated vital signs, decreased irritability, and improved sleep patterns, illustrate music therapy's potential to enhance well-being. The gentle melodies and tactile stimulation create an environment of comfort, thereby mitigating distress and promoting emotional equilibrium among the neonates. This theme affirms the therapeutic capacity of music therapy interventions to positively influence neonates' physiological responses and emotional states. Yue W *et al*, reported that music therapy interventions can have positive effects on the neonatal physiological parameters including heart rate, respiratory rate, oxygen saturation, oral feeding volume, reducing stress level, reducing maternal anxiety **[16]**. In another study authors found that live music therapy intervention had a significant effect to improve behavioral state of neonates including their crying spells and comfort **[17]**. In a study Lowey J *et al*. reported that music entrained breath sounds had significant effect in improving sleeping patterns of the neonates in NICU **[9]**.

- **Absence of Adverse Effects**

An important revelation is the absence of negative repercussions attributed to music therapy interventions. This finding underscores the safety and non-invasiveness of this therapeutic approach within the NICU context. The meticulously tailored interventions, including calming lullabies and tactile stimulation, ensure minimal stress for the infants. This safety profile, combined with music therapists' expertise, further establishes music therapy as a trusted and effective intervention to support neonates during their critical stages of development.

- **Positive Effect on Overall NICU Environment**

The study magnifies music therapy's broader influence by creating a serene and calming atmosphere within the NICU. This environment not only benefits neonates but also positively affects caregivers and staff. Amid the inherently demanding NICU setting, music therapy contributes to reducing stress and enhancing the overall experience. A harmonious atmosphere can lead to improved communication, collaboration, and focus among the healthcare team, ultimately fostering more effective care provision. There are a large body of literature supported that music therapy interventions were effective for reducing mother's anxiety **[18]**. Authors of another study revealed that music therapy interventions such singing and music-assisted relaxation were beneficial to caregivers of dementia patients **[19]**.

- **Recommendation as Complementary Therapy**

The participants' fervent endorsement of music therapy as a complementary therapy signifies its potential to augment conventional medical care. This recommendation reflects growing understanding of music therapy's multi-dimensional advantages, which complement physical interventions by addressing neonates' emotional and psychological well-being. This perspective encourages the incorporation of music therapy into routine care protocols, thereby enhancing the holistic approach to neonatal care.

- **Future Research Scope**

The discussion identifies future research avenues to refine music therapy interventions for neonates. This includes investigating optimal duration and frequency, differentiating responses in preterm and term infants, and exploring the application of music therapy to neonates receiving parenteral nutrition. Collaborative efforts among music therapists, healthcare providers, and researchers can advance evidence-based protocols that cater to neonates' distinct needs, contributing to their comprehensive growth and well-being.

- **Future Scope in India**

Highlighting India's cultural affinity for music, the study recognizes the promising scope for integrating traditional Indian music into evidence-based music therapy. By combining ancient musical heritage with contemporary therapeutic techniques, music therapy can resonate with cultural values and preferences. This approach not only enriches neonatal care but also promotes music therapy's accessibility and affordability across diverse healthcare settings.

In summary, the discussion's exploration of these seven themes reinforces the promising potential of music therapy in enhancing NICU

neonatal care. The observed benefits and absence of adverse effects underscore its viability as a complementary therapeutic strategy. By acknowledging future research prospects and its relevance in the Indian context, this study lays the foundation for continued growth and application of evidence-based music therapy. Through ongoing refinement and application, music therapy has the potential to significantly improve neonatal care and contribute to the holistic development of these fragile infants.

CONCLUSION:

In summary, this study illuminates the impactful integration of music therapy into the neonatal intensive care unit (NICU), showcasing its dual benefits: tangible impacts on neonatal well-being and the perspectives of the interdisciplinary team. Through video analysis and semi-structured interviews, the study highlights music therapy's potential in managing neonatal behavioral states during non-invasive procedures and enhancing overall care.

The video analysis underscores the effectiveness of personalized music therapy, incorporating mothers' preferred lullabies and tactile stimulation. This approach yields significant outcomes, including regulated vital signs, reduced irritability, improved sleep patterns, and enhanced relaxation. By combining auditory and tactile stimuli, music therapy creates a calming environment, fostering neonatal contentment and balance.

The interview analysis identifies seven key themes, emphasizing music therapy's integration in the NICU. From raising awareness among healthcare professionals to endorsing it as a complementary therapy, these themes showcase its multifaceted influence. The absence of adverse effects affirms its safety, while its ability to create a serene NICU environment benefits caregivers, staff, and neonates.

Furthermore, the study's forward-looking perspective identifies future research avenues and its relevance in the Indian context. Investigating intervention durations, differentiating infant responses, and integrating traditional Indian music underscore the ongoing potential of music therapy in neonatal care.

In conclusion, this study solidifies music therapy as a valuable complementary therapy in the NICU. The evidence supports its integration into established neonatal care, enriching the experience for premature and critically ill neonates. Bridging science and art, music therapy holistically enhances physiological parameters and emotional well-being. This study encourages further

exploration, collaboration, and application of evidence-based music therapy, ultimately nurturing the holistic growth and development of these fragile neonates.

Clinical implications:

The study's findings on music therapy with tactile stimulation in the NICU carry significant clinical implications:

- **Awareness**: Addressing limited music therapy awareness among NICU healthcare professionals is crucial through educational initiatives.
- **Complementary Care**: Music therapy's positive effects support its integration as a complementary approach, enhancing care for premature and critically ill newborns.
- **Personalization:** Customized interventions with preferred lullabies and tactile stimulation regulate vital signs, reduce irritability, and improve sleep.
- **Safety:** No adverse effects confirm music therapy's safety, allowing confident recommendation.
- **NICU Atmosphere:** Music therapy's calming influence benefits neonates and healthcare providers, fostering collaboration.
- **Future Research:** Future studies must focus on optimal parameters and impact on different infant populations.
- **Cultural Relevance:** In India, incorporating traditional music can enhance acceptance and accessibility.
- **Collaboration:** Collaboration with music therapists is essential for tailored interventions.

In conclusion, music therapy is a safe and effective complementary neonatal care option. Personalized interventions can improve well-being, while research and collaboration with music therapists continue to refine its integration, benefiting vulnerable infants.

Conflict of interest – NIL

Financial aid – NIL

All the authors have contributed significantly to qualify for authorship

Ethical issues - Yes – approved

REFERENCES:

[1] Bhutta AT, Cleves MA, Casey PH, Cradock MM, Anand KJS. Cognitive and behavioral outcomes of school-aged children who were born preterm: A meta-analysis. JAMA [Internet]. 2002;288(6):728. Available from: http://dx.doi.org/10.1001/jama.288.6.728

[2] Suman RPN, Udani R, Nanavati R.

Kangaroo mother care for low birth weight infants: a randomized controlled trial. Indian Pediatr. 2008;45(1):17–23.

[3] Patel AL, Johnson TJ, Engstrom JL, Fogg LF, Jegier BJ, Bigger HR, *et al*. Impact of early human milk on sepsis and health-care costs in very low birth weight infants. J Perinatol [Internet]. 2013;33(7):514–9. Available from: http://dx.doi.org/10.1038/jp.2013.2

[4] Amini E, Rafiei P, Zarei K, Gohari M, Hamidi M. Effect of lullaby and classical music on physiologic stability of hospitalized preterm infants: a randomized trial. J Neonatal Perinatal Med [Internet]. 2013;6(4):295–301. Available from: http://dx.doi.org/10.3233/NPM-1371313

[5] Thoma MV, La Marca R, Brönnimann R, Finkel L, Ehlert U, Nater UM. The effect of music on the human stress response. PLoS One [Internet]. 2013;8(8):e70156. Available from: http://dx.doi.org/10.1371/journal.pone.0070156

[6] Haslbeck FB, Jakab A, Held U, Bassler D, Bucher H-U, Hagmann C. Creative music therapy to promote brain function and brain structure in preterm infants: A randomized controlled pilot study. NeuroImage Clin [Internet]. 2020;25(102171):102171. Available from: http://dx.doi.org/10.1016/j.nicl.2020.102171

[7] Yildiz A, Arikan D. The effects of giving pacifiers to premature infants and making them listen to lullabies on their transition period for total oral feeding and sucking success: The effect of the odour of breast milk. J Clin Nurs [Internet]. 2012;21(5–6):644–56. Available from: http://dx.doi.org/10.1111/j.1365-2702.2010.03634.x

[8] Chou L-L, Wang R-H, Chen S-J, Pai L. Effects of music therapy on oxygen saturation in premature infants receiving endotracheal suctioning. J Nurs Res [Internet]. 2003;11(3):209–16. Available from: http://dx.doi.org/10.1097/01.jnr.0000347637.02971.ec

[9] Loewy J, Stewart K, Dassler A-M, Telsey A, Homel P. The effects of music therapy on vital signs, feeding, and sleep in premature infants. Pediatrics [Internet]. 2013;131(5):902–18. Available from: http://dx.doi.org/10.1542/peds.2012-

1367

[10] Souza SRBD, Lewis LES, Kumar V, Bhat RY, Purkayastha J, Kamath A. Effectiveness of Indian classical music on developmental responses of preterm infants-A randomized controlled trial protocol. Med-leg update [Internet]. 2017 [cited 2022 Jan 12];17(2):243. Available from: https://manipal.pure.elsevier.com/en/publications/effectiveness-of-indian-classical-music-on-developmental-response

[11] Ak J, Lakshmanagowda PB, G C M P, Goturu J. Impact of music therapy on breast milk secretion in mothers of premature newborns. J Clin Diagn Res [Internet]. 2015;9(4):CC04-6.

[12] Shukla VV, Bansal S, Nimbalkar A, Chapla A, Phatak A, Patel D, *et al*. Pain control interventions in preterm neonates: A randomized controlled trial. Indian Pediatr [Internet]. 2018 [cited 2022 Jan 12];55(4):292–6. Available from: https://www.indianpediatrics.net/apr2018/apr-292-296.htm

[13] Ak, Simalti. Effect of classical Indian music on vital parameters, growth and morbidity in preterm neonates. Indian Journal of Research. 2017: 6.

[14] Haslbeck FB. Creative music therapy with premature infants: An analysis of video footage. Nord J Music Ther [Internet]. 2014;23(1):5–35. Available from: http://dx.doi.org/10.1080/08098131.2013.780091

[15] Karulkar RR, Gunjawate DR, Sundar S. Understanding awareness of music therapy in parents of children with special needs in India: A survey study. Nord J Music Ther [Internet]. 2022;31(4):279–92. Available from: http://dx.doi.org/10.1080/08098131.2021.1955949

[16] Yue W, Han X, Luo J, Zeng Z, Yang M. Effect of music therapy on preterm infants in neonatal intensive care unit: Systematic review and meta-analysis of randomized controlled trials. J Adv Nurs. 2021; 77(2):635–52.

[17] Harrison W, Goodman D. Epidemiologic trends in neonatal intensive care, 2007-2012. JAMA Pediatr [Internet]. 2015 [cited 2023 Jul 26];169(9):855–62. Available from: https://jamanetwork.com/journals/jamapediatrics/fullarticle/2381545

[18] Olsson E, Ahl H, Bengtsson K,

Vejayaram DN, Norman E, Bruschettini M, *et al*. The use and reporting of neonatal pain scales: a systematic review of randomized trials. Pain [Internet]. 2021;162(2):353–60. Available from: http://dx.doi.org/10.1097/j.pain.0000000000002046

[19] Lee S, Allison T, O'Neill D, Punch P, Helitzer E, Moss H. Integrative review of singing and music interventions for family carers of people living with dementia. Health Promot Int [Internet]. 2022;37(Supplement_1):i49–61. Available from: http://dx.doi.org/10.1093/heapro/daac024