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Abstract

Effect of Music Intervention on Breast Milk Volume and Stress Among Indian Preterm Mothers †

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Nutrition is essential for preterm infants' growth, metabolism, and immunity [1–4]. The inadequate feeding capabilities of preterm infants and their higher nutritional requirements put pressure on mothers to produce and maintain an adequate milk supply, leading to maternal stress [5,6]. Music as a relaxation technique has been shown to reduce stress arousal and increase the quality and quantity of milk secretion, including its fat and calorie content [7–9]. Despite the proven benefits of music for stress reduction and milk secretion, it was of interest to study the effect of music intervention among breast pump-dependent preterm mothers. The objective was to assess the effect of music intervention on breast milk volume and stress among preterm mothers.

An open-label randomized controlled trial was conducted among 74 pump-dependent preterm mothers (37 each for the intervention and control groups) who delivered between 30 and 36 weeks of gestation and were admitted to a tertiary care university hospital in South India. All mothers were recruited on the third postnatal day and completed the post-test on the fifth postnatal day. Standardized Indian classical music (Hamsadhwani raga) was delivered through headphones for 30 min (15 min before and during the breast milk expression session) once a day for three consecutive days to the mothers in the intervention group. Breast milk volume was measured and recorded once a day for three days consistently between 10 and 11 am using a pocket weighing scale with the features of auto-calibration and tare full capacity. The calibration was manually tested daily using analytic weights. The weight (g) was converted to volume (mL) based on the density of human milk (1.03 g/mL). Stress was assessed using the Parental Stress Scale (PSS) by Berry and Jones [10] on the first and third day of intervention through interviews. Descriptive statistics were used to summarize participant characteristics, inferential statistics like independent *t*-tests were used to compare breast milk volume and stress scores between groups, and ANOVA was used to identify factors associated with these outcomes.

The results revealed that the mean gestational age was 32.95 ± 1.78 weeks in the intervention group and 32.96 ± 2.12 weeks in the control group. Other baseline characteristics were comparable between the groups. The average breast milk volume among the intervention group on the third day of intervention was 44.9 ± 7.48 mL, and for the control group, it was 33.17 ± 6.88 mL, with a mean difference of 11.73 mL (95% CI: 8.54–15.13, $p < 0.001$). The stress score among the intervention group was significantly lower (66.22 ± 3.30 vs. 68.97 ± 2.99 points) compared to the control group on the third day, with a mean difference of 2.73 points (95% CI: 1.53–3.87, $p < 0.001$). In the intervention group, maternal age

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(18–23 years, $p = 0.007$), gestational age at birth (35–36 weeks, $p < 0.001$), the number of breast expression sessions per day (>8 sessions, $p = 0.004$), infant condition at birth (not intubated, $p = 0.009$), and the mode of thermoregulation (kangaroo mother care, $p = 0.001$) were significantly associated with expressed breast milk volume. Maternal body mass index (with obesity, $p = 0.028$) and the causes of preterm labor (premature rupture of membrane, $p = 0.043$) were the factors related to parental stress.

Music intervention is a cost-effective, non-invasive method that positively impacts stress reduction and is associated with an increase in breast milk volume among preterm mothers. This study highlights the potential benefits of targeted music intervention for breast pump-dependent preterm mothers for breast milk volume enhancement and stress reduction.

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References

1. Roggero, P.; Liotto, N.; Menis, C.; Mosca, F. New Insights in Preterm Nutrition. *Nutrients* **2020**, *12*, 1857. [CrossRef] [PubMed]
2. Diehl-Jones, W.L.; Askin, D.F. Nutritional Modulation of Neonatal Outcomes. *AACN Adv. Crit. Care* **2004**, *15*, 83–96. [CrossRef] [PubMed]
3. Stephens, B.E.; Vohr, B.R. Protein Intake and Neurodevelopmental Outcomes. *Clin. Perinatol.* **2014**, *41*, 323–329. [CrossRef] [PubMed]
4. Thoene, M.K.; Lyden, E.; Anderson-Berry, A. Improving nutrition outcomes for infants < 1500 grams with a progressive, evidenced-based enteral feeding protocol. *Nutr. Clin. Pract.* **2018**, *33*, 647–655. [CrossRef] [PubMed]
5. Abu Bakar, S.A.; Muda, S.M.; Arifin, S.R.M.; Ishak, S. Breast milk expression for premature infant in the neonatal intensive care unit: A review of mothers' perceptions. *Enferm. Clin.* **2019**, *29*, 725–732. [CrossRef]
6. Hill, P.D.; Aldag, J.C.; Chatterton, R.T.; Zinaman, M. Comparison of Milk Output Between Mothers of Preterm and Term Infants: The First 6 Weeks After Birth. *J. Hum. Lact.* **2005**, *21*, 22–30. [CrossRef] [PubMed]
7. Ak, J.; Lakshmanagowda, P.B.; Pradeep, G.C.M.; Goturu, J. Impact of music therapy on breast milk secretion in mothers of premature newborns. *J. Clin. Diagn. Res.* **2015**, *9*, CC04–CC06. [CrossRef] [PubMed]
8. SefidHaji, S.; Aziznejadroshan, P.; Mojaveri, M.H.; Nikbakht, H.A.; Qujeq, D.; Amiri, S.R.J. Effect of lullaby on volume, fat, total protein and albumin concentration of breast milk in premature infants' mothers admitted to NICU: A randomized controlled trial. *Int. Breastfeed. J.* **2022**, *17*, 71. [CrossRef] [PubMed]
9. Yu, J.; Wells, J.; Wei, Z.; Fewtrell, M. Effects of relaxation therapy on maternal psychological state, infant growth and gut microbiome: Protocol for a randomised controlled trial investigating mother-infant signalling during lactation following late preterm and early term delivery. *Int. Breastfeed. J.* **2019**, *14*, 50. [CrossRef] [PubMed]
10. Berry, J.O.; Jones, W.H. The Parental Stress Scale: Initial Psychometric Evidence. *J. Soc. Pers. Relatsh.* **1995**, *12*, 463–472. [CrossRef]

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