Section: Pediatrics

Original Research Article

OUTCOMES OF LAUNCHING MOTHER'S MILK BANK IN NEONATAL INTENSIVE CARE UNIT IN A TERTIARY CARE HOSPITAL IN TIRUPPUR- A RETROSPECTIVE STUDY

R. Mohanambigai[1], S. Vani[1], B. Jane Amala Sebasty[1]

[1]Assistant Professor, Department of Pediatrics, Government Medical College Tiruppur, Tamil Nadu, India

Received : 17/09/2024
Received in revised form : 08/11/2024
Accepted : 22/11/2024

Keywords:
Neonatal intensive care, Mother's Milk Bank, donor human milk, neonatal outcomes, retrospective study.

Corresponding Author:
Dr. R. Mohanambigai,
Email: mohanambigai81@gmail.com

DOI: 10.47009/jamp.2024.6.6.65

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (6); 332-336

Abstract

Background: Breast milk plays a vital role in neonatal health, offering essential nutrients and immunological protection, especially for preterm or critically ill neonates in Neonatal Intensive Care Units (NICUs). For mothers unable to breastfeed, the introduction of a Mother's Milk Bank provides pasteurized donor human milk (PDHM), which reduces neonatal morbidity and mortality. This study aims to evaluate the outcomes of launching a Mother's Milk Bank in the NICU at Government Medical College Hospital, Tiruppur. **Materials and Methods:** A retrospective record review was conducted, comparing neonatal outcomes before and after the milk bank's inauguration in August 2021. The study included neonates admitted to the NICU from July 2020 to June 2023, categorized into pre-intervention and post-intervention groups. Data on birth weight, infection rates, NICU stay duration, and mortality were collected. Statistical analysis was performed using SPSS, with significance set at $P < 0.05$. **Result:** In neonates weighing 1500–2499 grams, the population increased from 820 pre-launch to 970 post-launch ($P = 0.006$). The survival rate improved from 90% pre-launch to 95% post-launch ($P = 0.001$). The referral and death rates decreased from 8% and 42%, respectively, to 1% and 4% post-launch. The amount of expressed breast milk (EBM) used increased from 228.47 liters to 254.085 liters. **Conclusion:** The launch of the Mother's Milk Bank in Tiruppur's NICU significantly improved neonatal outcomes, particularly in survival rates and reduced morbidity. These findings highlight the critical role of PDHM in enhancing neonatal care in resource-limited settings.

INTRODUCTION

The importance of breast milk for neonatal health is well established, as it provides essential nutrients, immunological protection, and contributes to the overall development of the infant, especially for those in Neonatal Intensive Care Units (NICUs).[1] For preterm or critically ill newborns, mother's milk can be life-saving, reducing the incidence of necrotizing enterocolitis, sepsis, and other infections.[2] However, many mothers, particularly those of preterm infants, may face difficulties in producing adequate milk due to medical or emotional factors. In such situations, the introduction of a Mother's Milk Bank serves as a critical intervention to bridge this gap by providing safe, pasteurized donor human milk.[3-5]

Tiruppur, a fast-developing region in Tamil Nadu, has seen rapid growth in healthcare infrastructure, with increasing demand for advanced neonatal care.[6] The launch of a Mother's Milk Bank in the NICU of a tertiary care hospital in this area represents a significant step toward addressing the nutritional and medical needs of neonates, particularly preterm and low-birth-weight infants.[7] The establishment of a structured milk donation system ensures that donor milk is available for those in need while maintaining safety and quality standards. A retrospective analysis of the outcomes associated with this initiative is necessary to assess its impact on neonatal health.[8-10] Retrospective studies provide valuable insights into past interventions and their effects. By analyzing clinical data before and after the implementation of the Mother's Milk Bank, we can evaluate its effectiveness in improving neonatal outcomes.[11-13] Key indicators such as rates of neonatal infections, hospital stay duration, weight gain, and mortality will provide a comprehensive picture of the Milk Bank's role in neonatal care. This study aims to fill the gap in the literature concerning the long-term benefits of milk banks in resource-limited settings like Tiruppur. Furthermore, human milk banking aligns with global public health priorities, particularly in resource-constrained settings where alternatives like formula

ISSN (O): 2687-5365; ISSN (P): 2753-6556

feeding are not ideal due to cost, accessibility, and the increased risk of infection.[14] A well-implemented milk bank has the potential to support breastfeeding goals, promote infant health, and offer a solution to the challenges faced by mothers who are unable to breastfeed, either temporarily or permanently. The outcomes from such an initiative will also contribute to policymaking for neonatal nutrition in the region.[15,16]

In this retrospective study, we aim to evaluate the outcomes of launching a Mother's Milk Bank in a NICU setting in Tiruppur. The data obtained from this research will provide evidence on the effectiveness of milk banks in reducing neonatal morbidity and mortality and improving the overall quality of neonatal care. These findings can help shape future interventions and inform strategies for broader implementation of milk banks across similar regions.

Objectives:

The objective of the study is to analyse the outcomes of launching Mother's Milk bank in Neonatal Intensive Care Unit in a tertiary care hospital in Tiruppur.

MATERIALS AND METHODS

Study design- This study was a retrospective record review conducted in the Neonatal Intensive Care Unit (NICU) of a tertiary care hospital in Tiruppur, Tamil Nadu. The comparison of clinical outcomes between these two time periods provided insights into the impact of the Mother's Milk Bank on neonatal health.

Study period- Milk bank was inaugurated in GMCH Tiruppur on August 2021. The study period was for a period of one year before milk bank initiation and three years after milk bank initiation.

Study population: The study population included neonates admitted to the NICU during the four-year review period.

Study methodology: Data were collected retrospectively from hospital medical records. The variables collected included demographic information (birth weight, gestational age, sex), clinical information (feeding type, infection rates, duration of NICU stay), and outcomes (weight gain, mortality, referral). Feeding data specifically included whether the neonate was fed with mother's own milk, donor human milk, or formula. Outcomes of neonates admitted during the year prior to the launch of the Mother's Milk Bank (pre-intervention group) were compared with those admitted in the year following its introduction (post-intervention group).

Ethical consideration: Ethical clearance was obtained from the Institutional Ethical Committee. The details were collected in a pretested semi structured proforma.

Data analysis: The data was entered in MS Excel and was analysed using SPSS version 25. Descriptive statistics such as frequencies and proportions were used and inferential statistics such as Chi square test were used. P value of less than 0.05 was considered significant. Data were expressed in tables and charts wherever necessary.

RESULTS

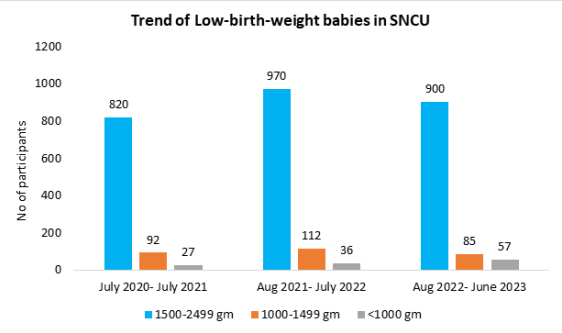

Figure 1: Trend of Low-birth-weight babies in SNCU

In the 1500–2499 grams category, the number of neonates increased from 820 during the July 2020 to July 2021 period to 970 between August 2021 and July 2022, followed by a slight decline to 900 in the period from August 2022 to June 2023. In the 1000–1499 grams category, the number of neonates rose from 92 in the first period to 112 in the second period, but decreased to 85 in the third period. Similarly, in the category of neonates weighing less than 1000 grams, the numbers steadily increased from 27 to 36, and finally to 57 over the three periods. Notably, the milk bank at Government Medical College Hospital, Tiruppur, was inaugurated in August 2021, which may have contributed to changes in neonatal outcomes and care practices. A chi-square analysis revealed a significant association in this category, with a chi-square value of 17.90 and a P-value of 0.006, indicating statistical significance.

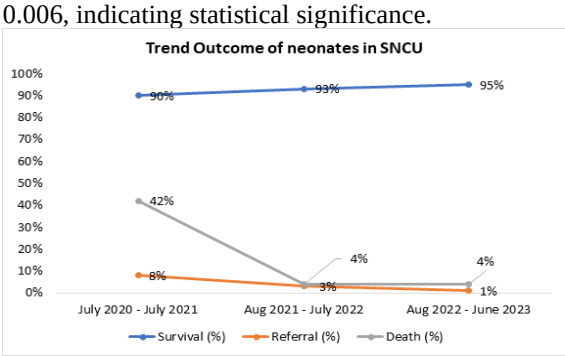

Figure 2: Trend Outcome of neonates in SNCU

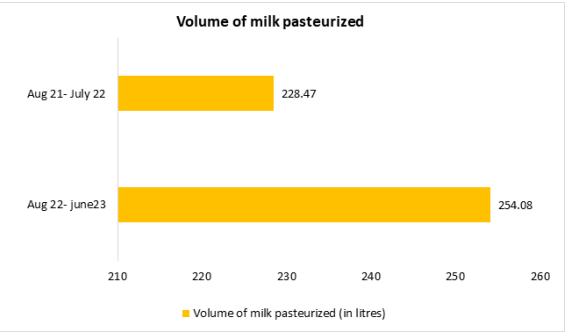

Figure 3: Volume of milk pasteurized

ISSN (O): 2687-5365; ISSN (P): 2753-6556

The survival rate for neonates in NICU increased steadily from 90% during the July 2020 to July 2021 period, to 93% between August 2021 and July 2022, and further to 95% from August 2022 to June 2023. The referral rate decreased from 8% in the first period to 3% in the second, and further to 1% in the third period. The death rate showed a sharp decline from 42% during July 2020 to July 2021 to 4% in both subsequent periods. These improvements in neonatal outcomes may be influenced by the inauguration of the milk bank at Government Medical College Hospital, Tiruppur, in August 2021, which likely contributed to better neonatal care. A chi-square analysis revealed a significant association in survival rates with a chi-square value of 34.82 and a P-value of 0.001, indicating statistical significance.

During the period from August 2021 to July 2022, a total of 228.47 litres of EBM was used. This amount increased to 254.085 litres between August 2022 and June 2023, reflecting a positive trend in the utilization of expressed breast milk. This increase may be associated with the establishment of the milk bank at Government Medical College Hospital, Tiruppur, in August 2021, which likely facilitated better access to breast milk for neonates in need.

Table 1: Trend of Low-birth-weight babies in SNCU.

Weight	July 2020- July 2021	Aug 2021- July 2022	Aug 2022- June 2023	Chi square value	P value
1500-2499 gm	820	970	900	17.90	0.006*
1000-1499 gm	92	112	85		
<1000 gm	27	36	57		

*- statistically significant by Chi square test

Table 2: Trend Outcome of neonates in SNCU

Outcome	July 2020 - July 2021	Aug 2021 - July 2022	Aug 2022 - June 2023	Chi square value	P value
Survival (%)	90%	93%	95%	34.82	0.001*
Referral (%)	8%	3%	1%		
Death (%)	42%	4%	4%		

*- statistically significant by Chi square test

Table 3: Volume of milk pasteurized

Year	Aug 21- July 22	Aug 22- june23
EBM (in litre)	228.47	254.085

DISCUSSION

The outcomes observed in this study after the inauguration of the Mother's Milk Bank at Government Medical College Hospital (GMCH), Tiruppur, align with existing literature, demonstrating the positive impact of Human Milk Banks (HMBs) on neonatal survival and care. The significant improvement in survival rates, reduction in referral and mortality rates, and increased utilization of expressed breast milk (EBM) highlight the potential benefits of establishing an HMB in enhancing neonatal care, particularly for vulnerable neonates.

The findings of this study are consistent with those reported by Hosseini et al1 who observed a reduction in the incidence of necrotizing enterocolitis (NEC), retinopathy of prematurity (ROP), late-onset sepsis (LOS), and mortality following the launch of an HMB in Al-Zahra Hospital, Iran. Similar to their study, where mortality was reduced from 15 to 8 cases post-HMB launch, the present study showed a significant decline in mortality, from 42% before the launch to 4% post-launch ($\chi 2 = 34.82$, $P = 0.001$). These results suggest that the introduction of an HMB in GMCH Tiruppur contributed to improved survival rates and a reduction in severe neonatal morbidities, consistent with global trends.

Mane et al,[2] also demonstrated the benefits of HMBs in reducing neonatal morbidity and mortality. In their study, a 24% reduction in sepsis and a 20% reduction in hyperbilirubinemia were observed in neonates receiving pasteurized donor human milk (PDHM) compared to those who did not receive PDHM. The present study similarly found a significant increase in survival rates after the establishment of the HMB, from 90% in the pre-launch period to 95% in the post-launch period, further corroborating the protective effect of PDHM in neonatal care. The reduction in the referral rate from 8% to 1% in this study mirrors the improvements in neonatal outcomes seen in Mane et al.'s study.

The study by Kumar et al,[4] provides further evidence of the positive impact of HMBs, particularly in terms of donor milk utilization and bacterial safety. In their study, over 90 liters of human milk were donated, benefiting a large number of preterm neonates. Similarly, the present study found that the volume of EBM utilized increased from 228.47 liters in the first year after the HMB's inauguration to 254.085 liters in the second year. This increased utilization likely contributed to the improved survival outcomes observed. Furthermore, the reduction in bacterial contamination in donor milk observed by Kumar et al. aligns with the improved care practices noted in the current study, where neonatal outcomes improved significantly post-HMB launch.

Sayan Kumar et al,[5] reported improved mortality and morbidity outcomes following the launch of an

ISSN (O): 2687-5365; ISSN (P): 2753-6556

HMB, with significant reductions in sepsis rates and shorter hospital stays. The findings of this study echo these results, as the survival rate improved from 90% to 95% over the study periods, and the death rate fell sharply from 42% pre-HMB to 4% post-HMB. These similarities suggest that the introduction of an HMB positively influences neonatal care, particularly in reducing infection rates and improving survival.

Adhisivam et al,[6] also highlighted the benefits of HMBs in reducing NEC incidence and neonatal mortality. In their study, neonatal mortality decreased from 11.32 to 10.77 per 1000 live births, while the incidence of NEC fell from 1.26% to 1.07%. The current study found an even more pronounced improvement in neonatal survival, with a reduction in the death rate from 42% to 4%. These findings reinforce the idea that the establishment of an HMB leads to significant improvements in neonatal outcomes, particularly in resource-limited settings.

The study by Arslanoglu et al,[14] supports the association between HMBs and increased breastfeeding rates, reporting a higher rate of exclusive breastfeeding in NICUs with HMBs compared to those without. Although our study did not directly assess breastfeeding rates, the increase in EBM utilization from 228.47 to 254.085 liters post-HMB inauguration suggests an improvement in access to breast milk, which likely contributed to better neonatal outcomes, as seen in Arslanoglu et al.'s findings.

Finally, Utrera et al,[16] found that the introduction of an HMB reduced the use of infant formula and enabled earlier initiation of enteral feeding, which is associated with better neonatal outcomes. In the present study, the improved survival rates and decreased mortality suggest that the availability of donor milk likely facilitated similar benefits, allowing for earlier and safer feeding of neonates in the NICU.

The results of this study are consistent with the broader literature on the benefits of HMBs, reinforcing the role of human milk in improving neonatal survival and reducing morbidity. The significant improvements observed in neonatal outcomes post-HMB inauguration at GMCH Tiruppur support the importance of establishing HMBs in tertiary care settings, particularly for premature and low-birth-weight infants.

The primary limitation of this study is its retrospective design, which may introduce bias and limit control over confounding variables. Additionally, the study was conducted in a single tertiary care hospital, limiting the generalizability of the findings to other settings.

CONCLUSION

The inauguration of the Mother's Milk Bank at Government Medical College Hospital, Tiruppur, in August 2021 has had a significant positive impact on neonatal outcomes in the Neonatal Intensive Care Unit (NICU). The findings of this retrospective study demonstrate that the availability of expressed breast milk (EBM) through the milk bank has been associated with substantial improvements in survival rates, a reduction in mortality and referral rates, and increased utilization of donor milk, particularly for premature and low-birth-weight neonates. The observed increase in survival from 90% to 95%, coupled with a marked decline in the death rate from 42% to 4%, suggests that the introduction of the milk bank has been a critical factor in enhancing the quality of neonatal care.

In conclusion, the establishment of a human milk bank in the NICU setting is a cost-effective, life-saving intervention that plays a vital role in improving neonatal health outcomes. The success of the milk bank at GMCH Tiruppur highlights its importance as a model for other tertiary care centers, particularly in resource-limited settings, where access to human milk can make a substantial difference in neonatal morbidity and mortality. Continued support and expansion of such programs will likely yield further improvements in neonatal survival and long-term health.

REFERENCES

1. Hosseini M, Farshbaf-Khalili A, Seyyedzavvar A, Fuladi N, Hosseini N, Talashi S. Short-term outcomes of launching mother's milk bank in neonatal intensive care unit: a retrospective study. Archives of Iranian Medicine. 2021 May 1;24(5):397-404.
2. Mane SV, Salunkhe S, Agarkhedkar S, Lakhwani P, Malwade S. Effect of Human Milk Banking on Immediate Neonatal Morbidity and Mortality: A Study in a tErtiary Care Center. Medical Journal of Dr. DY Patil University. 2022 Sep 1;15(5):682-6.
3. Torres-Muñoz J, Jimenez-Fernandez CA, Murillo-Alvarado J, Torres-Figueroa S, Castro JP. Clinical results of the implementation of a breast milk bank in premature infants (under 37 weeks) at the hospital universitario del valle 2018–2020. Nutrients. 2021 Jun 25;13(7):2187.
4. Kumar P, Kumaravel KS, Satheeshkumar D, Karuna C, Anurekha V. Human milk banking: One year experience from a tertiary care centre. Indian Journal of Child Health. 2018 Jul 26;5(7):457-60.
5. Sayan Kumar D, Prajapati N, Khaitan GG. 'Human Milk Bank (HMB): The Journey till Now and the Road Ahead': A Retrospective Observational Study in a Tertiary Care Centre of Western India. Journal of Neonatology. 2024 Mar;38(1):68-74.
6. Adhisivam B, Vishnu Bhat B, Banupriya N, Poorna R, Plakkal N, Palanivel C. Impact of human milk banking on neonatal mortality, necrotizing enterocolitis, and exclusive breastfeeding–experience from a tertiary care teaching hospital, south India. The Journal of Maternal-Fetal & Neonatal Medicine. 2019 Mar 19;32(6):902-5.
7. Johnson TJ, Berenz A, Wicks J, Esquerra-Zwiers A, Sulo KS, Gross ME, Szotek J, Meier P, Patel AL. The economic impact of donor milk in the neonatal intensive care unit. The Journal of pediatrics. 2020 Sep 1;224:57-65.
8. Song JT, Kinshella ML, Kawaza K, Goldfarb DM. Neonatal intensive care unit interventions to improve breastfeeding rates at discharge among preterm and low birth weight infants: a systematic review and meta-analysis. Breastfeeding Medicine. 2023 Feb 1;18(2):97-106.
9. Javadi M, Shahidi S, Pourmovahed Z, Palizban F. Improving Attitudes and Inclination towards Neonatal Feeding with Milk donated from Milk Bank in Mothers with Premature Neonates:

ISSN (O): 2687-5365; ISSN (P): 2753-6556

A Comparison of Two Educational Interventions. Iranian Journal of Neonatology. 2024 Jul 1;15(3).
10. Lakhkar B, Damke S, Meshram R. Human Milk Bank in a Rural Setup–A Success Story. Indian Journal of Community Medicine. 2022 Jul 1;47(3):317-20.
11. Mantri N, Goel AD, Joshi NK, Bhardwaj P, Gautam V, Gupta MK. Challenges in implementation of mother milk banks in Rajasthan: a situational analysis. Journal of Mother and Child. 2022 Apr 1;25(2):86-94.
12. Chauhan A, Kumar M, Tripathi S, Singh SN, Singh VK. Breastfeeding rates at discharge for very low birthweight neonates and their determinants: An observational study from a tertiary care neonatal intensive care unit in India. Journal of Paediatrics and Child Health. 2022 Sep;58(9):1653-60.
13. DL VK, Parasuramappa HS, Shivasharana B, Venugopal S, Manoj GM, Patil RB. Quality improvement (QI) initiative to increase the usage of mother's milk (EBM) for neonates admitted in special new-born care unit in South India. European Journal of Molecular and Clinical Medicine. 2022 Jan 1;9(1):1007-20.
14. Arslanoglu S, Moro GE, Bellù R, Turoli D, De Nisi G, Tonetto P, Bertino E. Presence of human milk bank is associated with elevated rate of exclusive breastfeeding in VLBW infants. Journal of perinatal medicine. 2013 Mar 1;41(2):129-31.
15. Coutsoudis I, Adhikari M, Nair N, Coutsoudis A. Feasibility and safety of setting up a donor breastmilk bank in a neonatal prem unit in a resource limited setting: An observational, longitudinal cohort study. BMC Public Health. 2011 Dec;11:1-7.
16. Utrera Torres MI, Medina López C, Vázquez Román S, Alonso Díaz C, Cruz-Rojo J, Fernández Cooke E, Pallás Alonso CR. Does opening a milk bank in a neonatal unit change infant feeding practices? A before and after study. International breastfeeding journal. 2010 Mar;5:1-5.

ISSN (O): 2687-5365; ISSN (P): 2753-6556