**Biomedical and Biopharmaceutical Research**
**Abbreviation**: Biomed. Biopharm. Res.
Volume: 09: Issue: 01 |Year: 2012
Page Number: 01-04

# Impact of feeding from human milk bank on Neonatal Mortality and low birth weight and very low birth weight babies

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Article Received:08-12-2011

Article Accepted:20-01-2012



## ABSTRACT

**Aims and Objectives:** To estimate the effect of feeding from a human milk bank on neonatal mortality in low birth weight (LBW) and very low birth weight (VLBW) babies. **Materials and Methods:** This was a retrospective observational study conducted in a tertiary care center in a metropolitan city. Data collection and analysis were performed for the period from 2007 to 2012. The study involved analyzing data on the Neonatal Mortality Rate (NMR) and disease-specific mortality rates for neonates admitted to the neonatal intensive care unit (NICU) of the tertiary care center. Additionally, the utilization of human milk during the corresponding years was assessed, followed by statistical analysis to estimate the effect of breastfeeding on neonatal mortality and morbidity rates, particularly in LBW and VLBW babies. **Results:** The establishment of a human milk bank and the supply of human milk to neonates, especially LBW babies, had a significant impact on neonatal mortality and morbidity. The total number of neonatal deaths was found to be significantly different before and after the establishment of the milk bank. The mean number of neonatal deaths before 2008 (70.66) was significantly higher than that after 2008 (mean number of deaths = 49.37) (Independent t-test, p-value < 0.05). The mean number of deaths due to sepsis was considerably higher before the establishment of the milk bank. However, the mean number of neonatal deaths due to other causes, such as asphyxia, sepsis, and necrotizing enterocolitis (NEC), before and after 2008, was not found to be statistically significant.

**Keywords:** Breastfeeding, Human milk bank, neonatalmortaility, neonatalmorbidity, prematurity.

## INTRODUCTION

Exclusive breastfeeding (breast milk only, with no water, other fluids, or solids) is recommended by The World Health Organization (WHO) for six months, with supplemental breast feeding continuing for two years and beyond.[1] Breastfeeding is widely recognized for its significant role in reducing neonatal mortality and improving health outcomes among infants, particularly those born with low birth weight (LBW) and very low birth weight (VLBW). Neonatal mortality remains a critical global health concern, and breastfeeding has been identified as a pivotal intervention in addressing this issue. Exclusive breastfeeding provides essential nutrients and immunity, significantly reducing risks associated with infectious diseases and promoting optimal neonatal health.[2,3]

Several studies have demonstrated the protective effects of breastfeeding against gastrointestinal infections, respiratory illnesses, and sudden infant death syndrome (SIDS), conditions notably prevalent among LBW and VLBW infants.[2] Breastfeeding has also been correlated with better growth trajectories and developmental outcomes, even though prolonged breastfeeding may initially reflect slower growth rates compared to formula-fed infants.[4,5]

Despite recognized benefits, the relationship between breastfeeding duration, neonatal mortality, and the health outcomes of LBW and VLBW infants continues to generate debate. Observational studies commonly present methodological challenges, including biases such as reverse causality and confounding factors, thus complicating the interpretation of results.[6,7]

Banked donor milk is commonly used in countries around the world as first feedings for premature infants. For most of these countries, banked donor milk is in short supply and only premature infants are fed this precious commodity; little donor milk is available for the older infant with a life-threatening condition. In the United States, the opposite is true, with approximately 60% to 70% of the volume of banked donor milk dispensed going to older infants, children, and the occasional adult with medical needs.

Given these complexities and the importance of neonatal outcomes, this study aims to evaluate the correlation between breastfeeding practices and neonatal mortality, specifically focusing on the effects of breastfeeding on infants born with

low birth weight and very low birth weight.

**OBJECTIVES**

To estimate the effect of feeding from a human milk bank on neonatal mortality in low birth weight (LBW) and very low birth weight (VLBW) babies.

**MATERIALSANDMETHODS**

This was a retrospective observational study includingcollectionofdataabout neonatal mortality rate, disease specific mortality rate for neonates admitted in neonatal intensive care unit of tertiary care center in metropolitan city during the year 2007 to2012andutilizationofhumanmilkincor- responding years, followed by statistical analysis of data. The milk bank facility in same tertiary center available from year 2008 onwards.

**RESULTSAND DISCUSSION**

Total number of neonatal deaths were found to be significantly different before & after establishment of milk bank. The mean number of neonatal deaths before 2008 (i.e 70.66) was found to be significantlyhigher Than that after 2008 (i.e mean number of deaths = 49.37) (Independent T test p value< 0.05).

Table:1Neonatal mortalityandmorbidityand its relation with humanmilk supply.

| | | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| NMR | | 39 | 48 | 36 | 41 | 51 | 64 |
| 1 Sepsis | | 13 | 19 | 25 | 14 | 26 | 14 |
| 2 BA | | 5 | 9 | 5 | 4 | 15 | 17 |
| 3 NEC | | 2 | 0 | 2 | 2 | 3 | 0 |
| 4 Pneumonia | | 1 | 11 | 2 | 0 | 6 | 8 |
| 5 LBW | 2-2.5KG | 4 | 7 | 12 | 6 | 8 | 9 |
| | 1-2KG | 10 | 15 | 4 | 9 | 12 | 6 |
| | <1KG | 5 | 17 | 7 | 13 | 13 | 9 |
| No.ofbabiespro- vided with EBM | | | 3124 | 2959 | 4386 | 2818 | 3367 |
| QTYofEBMused (in Ltrs) | | | 164 | 170 | 260 | 132 | 126 |

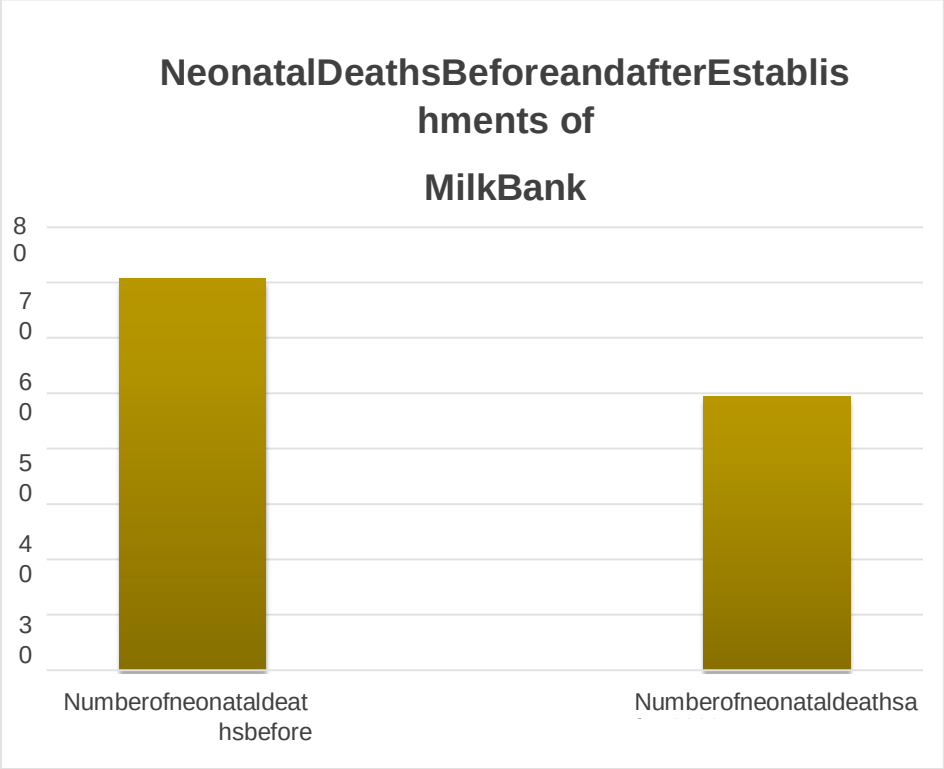
Difference of mean number of neonatal deaths with respect to other parameters i.e death due to asphyxia, sepsis, NEC etc before and after 2008 were found not be statistically significant, but the meannumberofdeathsduetosepsisandinweight category 1-2 kg were quite higher before establishmentofmilkbank.Itmaybeduetosmall sample size,for which further studies are neededto establish the facts.

Table2:Neonatal mortalitybefore andafterestablishment ofhumanmilkbank

| Typeofmortality | Mean numberof deaths before 2008 | Mean numberof deaths after 2008 | Statisticaldifference (Independent T test) |
|---|---|---|---|
| Neonataldeath | 70.66 | 49.37 | Pvalue<0.05 |
| NEC | 1.6 | 3.1 | Pvalue=0.36 |
| Deathdueto sepsis | 19.66 | 5.7 | P value=0.7 |
| Asphyxia | 8 | 9.6 | Pvalue=0.5 |
| Deathofneonatehaving weight 2-2.5 | 5.6 | 6.2 | Pvalue= 0.68 |
| Death of neonate of weight1-2kg | 18.66 | 9.5 | P value=0.06 |

| | | | |
|---|---|---|---|
| Death of neonate of weight<1kg | 7 | 11.5 | Pvalue=0.10 |

There were many studies which tried to analyze the effects of breast feeding practices and impact ofhumanmilkinreducing neonatalmorbidityand mortality(11).ThemostcomprehensivestudyfromThere were many studies which tried to analyze the effects of breast feeding practices and impact ofhumanmilkinreducing neonatalmorbidityand mortality[10].Themostcomprehensivestudyfrom




**DISCUSSION**

Numerous studies have analyzed the effects of breastfeeding practices and the impact of human milk in reducing neonatal morbidity and mortality[9]. One of the most comprehensive studies from Ghana concluded that up to 22% and 16% of all neonatal deaths could be prevented with universal breastfeeding coverage within 1 hour and 24 hours of birth, respectively.[10]

Babies admitted to the NICU face multiple challenges. Not only are they deprived of breastfeeding due to their weakness and inability to feed, but their mothers may also be unable to breastfeed due to medical conditions such as eclampsia, postpartum hemorrhage, and postpartum psychosis. The lack of maternal milk supply is a significant reason neonates receive formula feeds. In earlier times, wet nursing was commonly used to address such situations.[11] However, with the emergence of HIV, unscreened wet nursing is no longer recommended.[12]

To overcome this issue, human milk banking was introduced, ensuring that infants receive human milk even when their mothers' milk is unavailable. Donor milk banking has been successfully implemented in many developing countries, including India and several Southeast Asian and African nations[14]. In countries where donor milk banking is supported by the government and provided to neonates in need, it serves as an effective implementation of national health policy.

The results of this study align with Arnold et al[8], which demonstrated that banked donor milk significantly reduces neonatal morbidity and mortality, particularly by preventing necrotizing enterocolitis (NEC). Arnold's study highlights that hospitals prioritizing donor milk as the primary alternative to maternal milk for premature infants have substantially lower NEC rates. In a tertiary NICU setting, premature infants fed donor milk from birth had an NEC incidence rate as low as 0.1% to 0.125%, whereas NEC rates in NICUs without routine donor milk use were significantly higher, reaching 10.1% in some cases. These findings support our study's results, which showed a significant reduction in neonatal deaths after the establishment of a human milk bank.

Additionally, Arnold's cost-effectiveness analysis found that every $1 spent on donor milk saved between $6 and $37 in NICU costs due to a reduction in NEC and sepsis cases. Similarly, our study suggests that implementing human milk banking is a highly beneficial and cost-effective strategy in reducing neonatal mortality and morbidity. Before 2008, the mean number of neonatal deaths was 70.66, which significantly decreased to 49.37 after the introduction of the milk

bank ($p < 0.05$). Likewise, Arnold (2002) found that hospitals using donor milk experienced shorter NICU stays, leading to significant cost savings.

Breastfeeding is directly addressed in the Convention on the Rights of the Child. One of its articles states: *"States Parties recognize the right of the child to the enjoyment of the highest attainable standard of health and to the facilities for the treatment of illness and rehabilitation of health."* The provision of human milk, either through direct breastfeeding or donor milk banking, has a profound impact on neonatal mortality and morbidity.[13,14] Multiple studies, including Arnold (2002), have demonstrated that human milk significantly reduces neonatal mortality and morbidity when provided during the early stages of life.[15]

Our study aligns with these findings, concluding that human milk banking plays a crucial role in reducing neonatal mortality and morbidity while offering a substantial cost–benefit ratio.

## CONCLUSION

Human milk banking significantly reduces neonatal mortality and morbidity, particularly in low birth weight and very low birth weight infants. It is also an essential intervention for combating neonatal sepsis and NEC.

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