ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Evaluation Of Outcomes Of Very Low Birth Weight Neonates Discharged From A Tertiary Care Hospital.

JA Sultan Shahul Hameed Nizamudeen[1]*, and N Meenakumari[2].

[1]Assistant Professor, Department of Pediatrics, Government Medical College Hospital, Ramanathapuram, India.
[2]Senior Resident Department of Pediatrics, Government Medical College Hospital, Ramanathapuram, India.

ABSTRACT

Very low birth weight (VLBW; <1500 g) infants are vulnerable even after hospital discharge, facing risks of infection, poor growth, and developmental delays.To evaluate survival, readmissions, feeding, growth, and early neurodevelopment among VLBW infants discharged from a tertiary-care hospital. A cohort of 220 VLBW infants discharged from the NICU was analyzed, stratified as extremely low birth weight (<1000 g) and VLBW (1000–1499 g). Outcomes assessed included mortality and readmission within six months, feeding practices, growth indices, immunization, and neurodevelopment at follow-up**.** Readmission occurred in 18.2% and mortality in 6.8% of infants. Extremely low birth weight infants had higher readmission (28.9% vs 15.4%) and death (13.3% vs 5.1%) rates. Exclusive breastfeeding at discharge was 72.3% overall but lower in the <1000 g group. By 12 months, 29% remained underweight, and 14% had developmental quotient below normal range.Post-discharge outcomes of VLBW infants remain fragile, particularly for those <1000 g. Emphasis on breastfeeding, kangaroo mother care, timely immunization, and structured follow-up is vital to improve survival and development.

Keywords: very low birth weight, neonatal intensive care, post-discharge outcomes, kangaroo mother care, breastfeeding, neurodevelopment

https://doi.org/10.33887/rjpbcs/2025.16.5.20

**Corresponding author*

ISSN: 0975-8585

INTRODUCTION

Very low birth weight (VLBW) infants, defined as those weighing less than 1500 g at birth, constitute one of the most fragile populations in neonatal care. Despite major advances in perinatal medicine, the survival of these infants does not guarantee favorable outcomes after hospital discharge. They continue to face heightened risks of recurrent infections, feeding difficulties, growth faltering, and neurodevelopmental delays, particularly in the first year of life [1]. Globally, preterm birth and its consequences remain leading contributors to under-five mortality, with the highest burdens recorded in South Asia and sub-Saharan Africa [2].

In India, where neonatal mortality has steadily declined, the focus has shifted towards reducing post-discharge morbidity and improving long-term developmental potential. National guidelines strongly recommend kangaroo mother care (KMC), exclusive breastfeeding, and structured follow-up to optimize survival and growth among low-birth-weight infants [3]. Evidence consistently demonstrates that early initiation and continuation of KMC enhances thermoregulation, promotes exclusive breastfeeding, and lowers the risk of severe infection [4]. Similarly, immediate KMC trials have shown improved survival rates even in resource-limited settings [5].

Beyond survival, the importance of post-discharge monitoring has been emphasized in global action frameworks on preterm birth. Early growth monitoring, timely immunization, and structured neurodevelopmental screening are now recognized as essential interventions to bridge the gap between hospital survival and healthy childhood [6]. Despite these recommendations, outcome data from many Indian tertiary-care hospitals remain limited. Reports are often heterogeneous, vary in follow-up periods, and rarely include both growth and neurodevelopmental outcomes.

The present study was therefore designed to evaluate early outcomes of VLBW neonates discharged alive from a tertiary-care hospital. It specifically assesses mortality, readmissions, feeding status, growth trajectories, and neurodevelopmental screening during the first year of corrected age, providing insights that may guide strengthening of follow-up practices in similar resource-constrained settings.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted in the neonatal intensive care unit (NICU) Department of Pediatrics, Government Medical College Hospital, Ramanathapuram, India in the year 2022 to 2023. The NICU functions as a referral center for both rural and semi-urban communities, and most families belong to low- to middle-income groups. Infants discharged from this unit are routinely followed up through dedicated neonatal clinics.

Study Population

All neonates with birthweight below 1500 g who were discharged alive from the NICU during the study period were included. For subgroup analysis, infants were classified as extremely low birth weight (ELBW, <1000 g) and VLBW (1000–1499 g). Infants with lethal congenital malformations or those whose caregivers declined follow-up participation were excluded.

Follow-Up Protocol

Discharged infants were scheduled for follow-up at 2 weeks, 6 weeks, 3 months, 6 months, and 12 months of corrected gestational age (CGA). Caregivers were instructed to bring infants earlier if they developed feeding difficulties, recurrent illness, or poor weight gain. At each visit, trained pediatricians assessed growth, feeding status, immunization, and neurodevelopmental milestones.

Outcome Measures

Primary outcomes: mortality within six months of discharge and hospital readmissions during the same period.

Secondary outcomes: feeding practices at discharge (exclusive breastfeeding, mixed feeding, or formula), continuation of kangaroo mother care (KMC) at home, immunization status by one year, anthropometric measures (weight-for-age, length-for-age, weight-for-length Z-scores), and early neurodevelopmental outcomes.

Neurodevelopmental assessment: the Trivandrum Development Screening Chart (TDSC) was used at six months CGA. At twelve months CGA, developmental status was assessed using the Developmental Assessment Scale for Indian Infants (DASII). Developmental quotient (DQ) <85 was considered subnormal. Infants with abnormal tone or motor delay were evaluated clinically for cerebral palsy.

Data Collection and Analysis

Demographic, perinatal, and clinical data were collected from medical records and verified during follow-up visits. Continuous variables were presented as means with standard deviations or medians with interquartile ranges, depending on distribution. Categorical variables were expressed as frequencies and percentages. Group comparisons between ELBW and VLBW strata were carried out using chi-square or Fisher's exact test for categorical outcomes and independent t-test for continuous variables. A p-value <0.05 was considered statistically significant.

RESULTS

Baseline Profile of the Cohort

A total of 220 VLBW infants were discharged alive during the study period of 2022-2023, of whom 45 (20.5%) were extremely low birth weight (<1000 g). The mean gestational age at birth was 30.8 ± 2.6 weeks, and the male-to-female ratio was approximately 1.2:1. Nearly 68% of mothers had received at least one dose of antenatal steroids, and 58% of deliveries were by cesarean section. Exclusive breastfeeding at discharge was documented in 72.3%, while kangaroo mother care (KMC) was practiced by 85% during hospitalization. Median discharge weight was 1450 g (IQR 1360–1550).

Table 1: Baseline and discharge characteristics of VLBW infants (N=220)

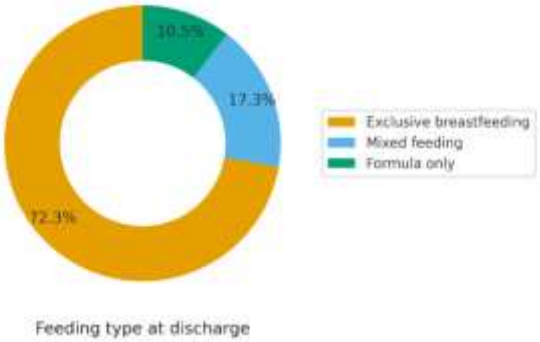
Characteristic	Value
Total discharged alive (n)	220
Birthweight category: <1000 g (ELBW)	45 (20.5%)
Birthweight category: 1000–1499 g	175 (79.5%)
Gestational age at birth, mean (SD), weeks	30.8 (2.6)
Male sex, n (%)	119 (54.1%)
Antenatal steroids (≥1 dose), n (%)	150 (68.2%)
Cesarean delivery, n (%)	128 (58.2%)
Singleton pregnancy, n (%)	198 (90.0%)
Discharge weight, median (IQR), g	1450 (1360–1550)
Postmenstrual age at discharge, mean (SD), weeks	36.4 (1.8)
Exclusive breastfeeding at discharge, n (%)	159 (72.3%)
KMC practiced during hospitalization, n (%)	187 (85.0%)

Feeding Practices at Discharge

At discharge, exclusive breastfeeding was the most frequent feeding practice (72.3%), but its prevalence was lower among ELBW infants (53.3%) compared to the 1000–1499 g group (77.1%). Mixed feeding and formula supplementation were more common in ELBW.

ISSN: 0975-8585

Figure 1. Feeding type at discharge among VLBW infants



Donut chart showing proportions of exclusive breastfeeding, mixed feeding, and formula only

Post-Discharge Outcomes within Six Months

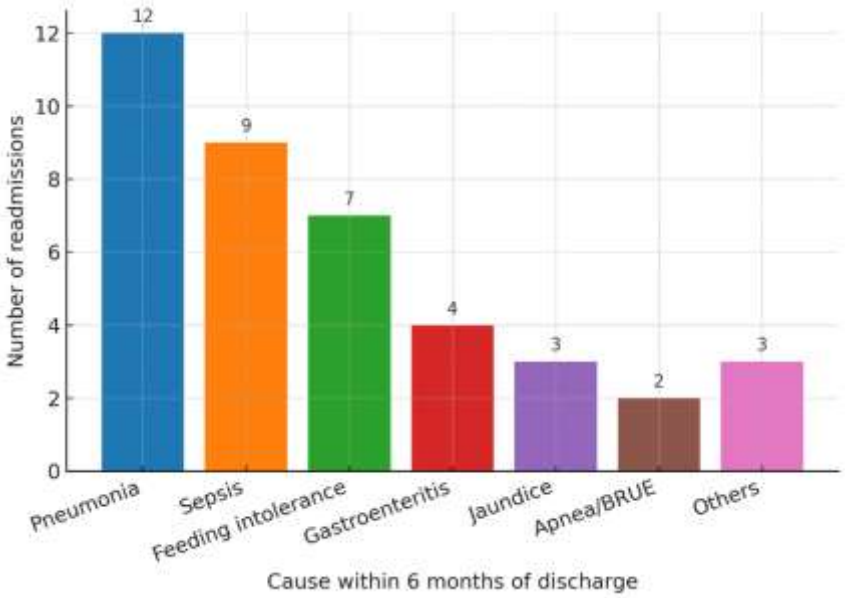
Out of 220 infants, 40 (18.2%) required hospital readmission within six months of discharge. Respiratory illnesses, notably pneumonia (12 cases) and sepsis (9 cases), accounted for the majority. Post-discharge mortality was recorded in 15 infants (6.8%), with higher proportions in ELBW compared to 1000–1499 g infants (13.3% vs 5.1%).

Table 2. Post-discharge outcomes by birthweight category (≤6 months after discharge)

Outcome	<1000 g (ELBW) (n=45)	1000–1499 g (n=175)	Total (N=220)
Readmission ≤6 months	13 (28.9%)	27 (15.4%)	40 (18.2%)
Post-discharge death ≤6 months	6 (13.3%)	9 (5.1%)	15 (6.8%)
Exclusive breastfeeding at discharge	24 (53.3%)	135 (77.1%)	159 (72.3%)

The causes of readmission are displayed in **Figure 2**, with pneumonia and sepsis accounting for over half of events.

Figure 2: Causes of hospital readmission ≤6 months after discharge



Bar chart showing distribution of causes: pneumonia, sepsis, feeding intolerance, gastroenteritis, jaundice, apnea/BRUE, others

ISSN: 0975-8585

Growth and Immunization Status

At six months corrected age, 34% of infants were underweight, 28% stunted, and 10% wasted. By twelve months, these proportions improved slightly, with underweight at 29%, stunting at 25%, and wasting at 9%. Immunization coverage by one year was 81%, with delays primarily noted in DPT-containing vaccines and measles-rubella.

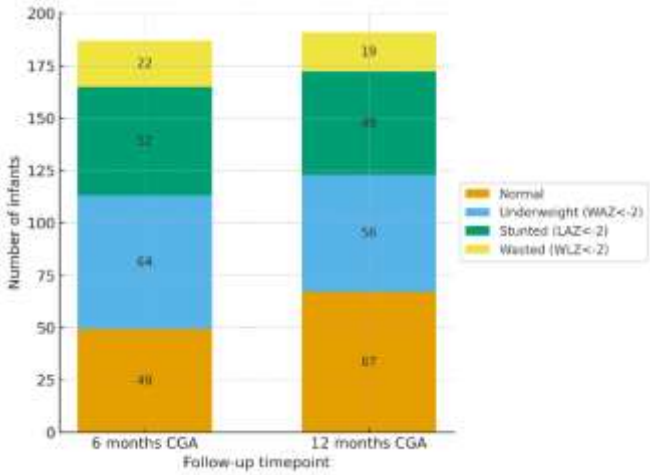
Table 3: Growth and neurodevelopmental outcomes at 6 and 12 months corrected age

Measure	<1000 g (ELBW)	1000–1499 g
Assessed at 6 months CGA, n	39	148
Underweight (WAZ<-2) at 6 months, n (%)	18 (46.1%)	46 (31.1%)
Stunted (LAZ<-2) at 6 months, n (%)	14 (35.9%)	38 (25.7%)
Wasted (WLZ<-2) at 6 months, n (%)	6 (15.3%)	16 (10.8%)
Assessed at 12 months CGA, n	37	154
Underweight (WAZ<-2) at 12 months, n (%)	14 (37.8%)	42 (27.3%)
Stunted (LAZ<-2) at 12 months, n (%)	12 (32.4%)	37 (24.0%)
Wasted (WLZ<-2) at 12 months, n (%)	4 (10.8%)	15 (9.7%)
TDSC positive at 6 months, n (%)	8 (20.5%)	26 (17.6%)
DASII DQ<85 at 12 months, n (%)	6 (16.2%)	21 (13.6%)
Cerebral palsy diagnosed by 12 months, n	2	4

Neurodevelopmental Screening Outcomes

At six months CGA, 18% of infants screened positive on the Trivandrum Development Screening Chart. By twelve months, 14% had DASII scores below 85, and six infants (3%) were diagnosed clinically with cerebral palsy.

Figure 3: Growth outcomes at 6 and 12 months corrected age



Stacked bar chart comparing proportions of normal, underweight, stunted, and wasted infants at 6 and 12 months

DISCUSSION

This study highlights that survival to hospital discharge in very low birth weight (VLBW) infants does not guarantee stability in the months that follow. Nearly one in five infants required readmission within six months, and close to seven percent succumbed after discharge. These figures are consistent with Indian prospective cohorts, where rehospitalization rates for VLBW and very preterm infants' range

between 15–20% and are driven mainly by infectious causes such as pneumonia and sepsis [7]. The higher vulnerability among extremely low birth weight (ELBW) infants, with nearly triple the post-discharge mortality compared to those weighing 1000–1499 g, reflects patterns observed in multicentric reports and underscores the need for more intensive surveillance in this subgroup [8].

Feeding practices at discharge emerged as another critical determinant. While the majority of infants were discharged on exclusive breastfeeding, rates were significantly lower among ELBW. Earlier studies have demonstrated that continuation of kangaroo mother care and lactation support are strongly linked to sustained exclusive breastfeeding and reduced morbidity [9]. Global evidence, including large-scale community-based trials in India, has confirmed that KMC not only improves feeding outcomes but also lowers the risk of serious infections and mortality [10,11].

Growth trajectories showed partial improvement between six and twelve months corrected age, yet nearly one-third of infants remained underweight by the end of the first year. Longitudinal studies from South India echo this finding, noting that postnatal growth failure is frequent and is closely tied to later neurodevelopmental delay [12]. In our cohort, neurodevelopmental screening identified concerns in almost one-fifth of infants at six months, and 14% had subnormal DASII scores at twelve months. These proportions are in line with prior reports that emphasize the importance of early and repeated screening in VLBW follow-up clinics [13].

Immunization delays were observed in nearly one-fifth of infants, a recurring challenge in this population. Literature shows that despite guidelines recommending vaccines by chronological age, low birth weight and preterm infants often face postponed schedules, which increases susceptibility to respiratory and diarrheal diseases [14]. Addressing these missed or delayed opportunities remains a low-cost, high-impact intervention for preventing morbidity in this group.

The strengths of the present work include systematic follow-up across the first year of life, integration of both growth and neurodevelopmental outcomes, and detailed subgroup comparisons. Nonetheless, limitations must be acknowledged. Being a single-center study, the findings may not be fully generalizable to all tertiary units. Follow-up losses, though minimized, may underestimate the true burden of morbidity. Finally, neurodevelopmental outcomes were assessed only up to one year; longer follow-up into early childhood would provide a fuller picture of cognitive and motor outcomes.

In summary, our findings reinforce the need for comprehensive post-discharge care packages for VLBW infants. Strengthening home-based KMC, promoting breastfeeding, ensuring timely immunization, and embedding early screening tools such as the Trivandrum Development Screening Chart into neonatal follow-up programs could mitigate the vulnerabilities observed. Such integrated approaches are central to bridging the gap between NICU survival and healthy long-term development [15].

CONCLUSION

VLBW infants remain highly vulnerable after hospital discharge, with elevated risks of readmission, mortality, growth faltering, and developmental delay, particularly among those weighing below 1000 g. Strengthening breastfeeding support, sustaining kangaroo mother care, ensuring timely immunization, and integrating structured follow-up with growth and neurodevelopmental surveillance are essential to improve survival and long-term outcomes in this fragile population.

REFERENCES

[1] World Health Organization. Preterm birth. Geneva: WHO; 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/preterm-birth

[2] UNICEF; World Health Organization. Low birthweight estimates: Levels and trends 2000–2015. New York/Geneva: UNICEF and WHO; 2019. Available from: https://cdn.who.int/media/docs/default-source/mca-documents/nbh/unicef-who-low-birthweight-estimates-2019-.pdf

[3] Ministry of Health and Family Welfare (Government of India). Operational guidelines: Kangaroo Mother Care & Optimal Feeding of Low Birth Weight Infants. New Delhi: MoHFW; 2014. Available from: https://nhm.gov.in/images/pdf/programmes/child-

health/guidelines/Operational_Guidelines-KMC_%26_Optimal_feeding_of_Low_Birth_Weight_Infants.pdf

[4] Conde-Agudelo A, Díaz-Rossello JL. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. Cochrane Database Syst Rev. 2016;2016(8):CD002771. doi:10.1002/14651858.CD002771.pub4

[5] WHO Immediate KMC Study Group. Immediate "Kangaroo Mother Care" and survival of infants with low birth weight. N Engl J Med. 2021;384(21):2028-38. doi:10.1056/NEJMoa2026486

[6] Lawn JE, Howson CP, Kinney M, et al. Born Too Soon: Decade of action on preterm birth. New York/Geneva: UNICEF, WHO, PMNCH; 2023. Available from: https://data.unicef.org/wp-content/uploads/2023/05/Born-too-soon-decade-of-action-on-preterm-birth.pdf

[7] Kumar V, Anand P, Verma A, Thukral A, Sankar MJ, Agarwal R. Need for repeat-hospitalization in very low birth weight or very preterm infants: a prospective cohort study. Indian J Pediatr. 2025;92(5):502-8. doi:10.1007/s12098-023-04999-7

[8] Oommen SP, Santhanam S, John H, Roshan R, Swathi TO, Padankatti C, et al. Neurodevelopmental outcomes of very low birth weight infants at 18–24 months corrected gestational age in a tertiary health centre: a prospective cohort study. J Trop Pediatr. 2019;65(6):552-60. doi:10.1093/tropej/fmz006

[9] Mazumder S, Taneja S, Dube B, Bhatia K, Ghosh R, Shekhar M, et al. Effect of community-initiated kangaroo mother care on survival of infants with low birthweight: a randomised controlled trial. Lancet. 2019;394(10210):1724-36. doi:10.1016/S0140-6736(19)32223-8

[10] World Health Organization. Kangaroo mother care: implementation strategy for preterm and low birth-weight infants. Geneva: WHO; 2023. Available from: https://apps.who.int/iris/handle/10665/367625

[11] Mazumder S, Upadhyay RP, Taneja S, Sharma S, Mony P, Bahl R, et al. Kangaroo mother care: using formative research to design an implementation strategy for scale-up in India. Glob Health Sci Pract. 2018;6(2):333-47. doi:10.9745/GHSP-D-17-00419

[12] Mukhopadhyay K, Mahajan R, Malhi P, Narang A. Neurodevelopmental outcome of very low birth weight babies at corrected age of 2 years. Indian J Pediatr. 2010;77(9):963-7. doi:10.1007/s12098-010-0172-0

[13] Nair MKC, Nair GS, George B, Suma N, Leena ML, Resmi V. Development and validation of Trivandrum Development Screening Chart for children aged 0–6 years. Indian J Pediatr. 2013;80(2):248-55. doi:10.1007/s12098-013-1144-2

[14] Soans S, Mihályi A, Berlaimont V, Kolhapure S, Agrawal A. Vaccination in preterm and low birth weight infants in India. Hum Vaccin Immunother. 2022;18(1):1-12. doi:10.1080/21645515.2020.1866950

[15] Johnson S, Wolke D, Hennessy E, Marlow N. Educational outcomes in extremely preterm children: neuropsychological correlates and predictors of attainment. Dev Neuropsychol. 2011;36(1):74-95. doi:10.1080/87565641.2011.540541