

EFFECTS OF EARLY VERSUS LATE TROPHIC FEEDING IN PRE-TERM LOW BIRTH WEIGHT NEONATES

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Abstract

Background: Trophic feeding refers to minimal enteral nutrition administered to stimulate gut maturation in preterm neonates. The timing of trophic feeding initiation may influence critical outcomes such as feeding tolerance, weight gain, and duration of hospitalization.

Objective: To compare the outcomes in preterm low birth weight neonates receiving early trophic feeding (initiated within 24 hours of life) versus late trophic feeding (initiated after 72 hours of life).

Methods: A randomized controlled trial was conducted in the NICU of Fauji Foundation Hospital, Rawalpindi from March 2025 to 15 June 2025. A total of 220 neonates (<34 weeks gestation, birth weight <2500g) were randomly assigned to early (Group A) or late (Group B) trophic feeding groups. Key outcomes included duration of parenteral nutrition, weight gain at discharge, duration of hospitalization, and feeding intolerance. Data were analyzed using SPSS version 21.

Results: A total of 220 preterm low birth weight neonates were randomized into early (within 24 hours) and late (after 72 hours) trophic feeding groups. Infants in the early feeding group showed significantly greater weight gain (580 ± 85 g vs. 490 ± 95 g; $p = 0.001$), shorter duration of parenteral nutrition (9.2 ± 4.6 vs. 14.1 ± 6.4 days; $p < 0.001$), and reduced hospital stay (12.1 ± 8.6 vs. 21.1 ± 9.1 days; $p < 0.001$). Abdominal distension was less common in the early group (9.1% vs. 20.0%; $p = 0.02$), while vomiting showed no significant difference. Early trophic feeding was associated with improved clinical outcomes and better feeding tolerance.

Conclusion: Early initiation of trophic feeding within 24 hours appears beneficial in preterm low birth weight neonates, potentially improving health outcomes and reducing hospital resource use.

INTRODUCTION

Trophic feeding refers to the administration of small volumes of enteral nutrition to stimulate the maturation of the underdeveloped gastrointestinal tract in preterm infants (1). Early initiation of enteral

feeding is very crucial in the growth and development of the neonate. It enhances the development of gut mucosa, fortifies immune mechanism and aids in the development of

microbiome. Moreover, it promotes digestion by promoting the action of swallowing and the formation of the sucking behavior (2). Early trophic feeding is generally characterized by providing little milk amounts during the first week after birth. This habit is being related with faster intestinal maturation, enhanced feeding tolerance, and faster attainment of full enteral feeding without parenteral nutritional support dependency. On the other hand, the navigator is known to create poor short term and long-term physical and neurodevelopment results with an alternative postponement of trophic feeding (3).

As Dorling et al. proved, gradual trophic enteral feeds before day 4 of life and quick initiation of trophic feeding within 48 hours of birth at a progression rate of more than 24ml/kg/day is not only a safe but effective practice in clinically stable very preterm and very low birth weight (VLBW) infants without increasing mortality (4).

According to Sallakh-Niknezhad and colleagues (2012), the earlier achievement of birth weight and the shortened hospital stay were reported in neonates who were fed at an early stage than neonates who were alternatively delayed. They observed also, less parenteral feeding requirements, and less feeding complications in the early group. In the same manner, 38.18 percent of preterm neonates appeared to be feeding intolerant according to Kayastha et al. (2022) where abdominal bloating and vomiting were most frequently observed, even among those who were fed early (5,6).

Nevertheless, early feeding has significant clinical advantages in spite of these difficulties. The current research is proposed to assess that and support the impact of early trophic feeding on the enhancement of the outcomes in low birth weight preterm infants. Since this population is particularly vulnerable, evidence-based nutritional intervention like early feeding is likely to improve survival of this group, recovery, and subsequent development considerably, and, therefore, it may form the foundation of the clinical guidelines and standards of neonatal care.

Objective

To compare the clinical outcomes weight gain, duration of parenteral nutrition, length of hospital stay, and feeding tolerance in preterm low birth

weight neonates receiving early trophic feeding (within 24 hours of birth) versus late trophic feeding (after 48 hours of birth).

Materials and Methods

This randomized controlled trial conducted in the Paediatric Neonatal Intensive Care Unit (NICU) of Fauji Foundation Hospital, Rawalpindi from 2 March 2025 to 15 June 2025. A total of 220 preterm low birth weight neonates will be included, with 110 neonates allocated to each group. The sample size was calculated using the WHO sample size calculator, considering a significance level of 5% and a power of 80%, based on previously reported proportions. A consecutive non-probability sampling technique will be used for recruitment, and neonates will be randomly assigned to one of two groups: Group A, receiving early trophic feeding (within 24 hours of birth), and Group B, receiving late trophic feeding (after 48 hours of birth).

Inclusion Criteria

This study involved preterm neonates with gestational age under 34 weeks and birth weight below 2500 grams. Only clinically stable infants with a 1-minute APGAR score above 7 were included. Both male and female infants, delivered vaginally or via cesarean section, were enrolled.

Exclusion Criteria

Neonates with major congenital anomalies, severe birth asphyxia, or confirmed sepsis were excluded.

Data Collection Procedure

Following approval from the ethical review committee and informed consent from parents, eligible neonates were randomly assigned to two groups: Group A, where trophic feeding was initiated within the first 24 hours of life, and Group B, where feeding began after 72 hours. Both groups received expressed breast milk at a rate of 15 ml/kg/day, administered via bolus feeding through an oral feeding tube, which was changed daily to maintain hygiene. Feeding was given every 4 to 6 hours, and in cases where breast milk was unavailable, formula milk (prepared according to standard guidelines) was used. Parenteral nutrition was provided as needed and discontinued once full enteral feeding was

achieved. Daily monitoring was carried out by trained NICU staff, with data recorded on weight changes, feeding tolerance (vomiting or abdominal distension), duration of hospitalization, and duration of parenteral nutrition, ensuring consistent adherence to the study protocol.

Data Analysis

Data were analyzed using SPSS version 21. Quantitative variables, including weight gain, duration of hospital stay, and duration of parenteral nutrition, were expressed as mean $\pm$ standard deviation (SD) and compared between groups using independent sample t-tests. Qualitative variables, such as the presence of vomiting and abdominal distension, were analyzed using the Chi-square test to assess differences in feeding tolerance between the groups. To control for potential effect modifiers such as gender and mode of delivery, post-stratification analysis was conducted. A p-value ≤ 0.05 was considered statistically significant.

Table 1: Baseline Characteristics of Neonates

Variable	Early Feeding (n=110)	Late Feeding (n=110)	p-value
Gestational Age (weeks)	31.6 $\pm$ 1.5	31.8 $\pm$ 1.6	0.42
Birth Weight (grams)	1340 $\pm$ 210	1355 $\pm$ 195	0.58
Male Gender (%)	56 (50.9%)	58 (52.7%)	0.77
Cesarean Delivery (%)	61 (55.5%)	59 (53.6%)	0.78

Table 1 presents the baseline characteristics of neonates in both the early and late trophic feeding groups. The data shows no statistically significant differences between the groups regarding gestational age, birth weight, gender distribution, and mode of

Results

A total of 220 preterm low birth weight neonates were randomly assigned to two groups: early trophic feeding (initiated within 24 hours of birth) and late trophic feeding (initiated after 72 hours). The early feeding group demonstrated significantly better clinical outcomes, including higher weight gain (580 $\pm$ 85 g vs. 490 $\pm$ 95 g; p = 0.001), a shorter duration of parenteral nutrition (9.2 $\pm$ 4.6 vs. 14.1 $\pm$ 6.4 days; p < 0.001), and a reduced length of hospital stay (12.1 $\pm$ 8.6 vs. 21.1 $\pm$ 9.1 days; p < 0.001). The incidence of abdominal distension was notably lower in the early feeding group (9.1% vs. 20.0%; p = 0.02), indicating better gastrointestinal tolerance. Although vomiting was slightly more common in the late group, the difference was not statistically significant. Overall, early trophic feeding was found to be a safe and effective strategy that supports improved nutritional outcomes, faster clinical recovery, and enhanced feeding tolerance in preterm neonates.

delivery (all p-values > 0.05). This indicates that both groups were comparable at the start of the study, which strengthens the reliability of outcome comparisons.

Table 2: Clinical Outcomes

Outcome	Early Feeding (n=110)	Late Feeding (n=110)	p-value
Weight Gain (grams)	580 $\pm$ 85	490 $\pm$ 95	0.001*
Duration of Parenteral Nutrition (days)	9.2 $\pm$ 4.6	14.1 $\pm$ 6.4	<0.001*
Duration of Hospital Stay (days)	12.1 $\pm$ 8.6	21.1 $\pm$ 9.1	<0.001*

*Statistically significant

Table 2 highlights key clinical outcomes. Neonates in the early feeding group had significantly greater weight gain by the time of discharge (580g vs. 490g, p=0.001). The duration of parenteral nutrition was notably shorter (9.2 vs. 14.1 days, p<0.001), indicating a faster transition to enteral feeds.

Additionally, the early group experienced a significantly shorter hospital stay (12.1 vs. 21.1 days, p<0.001), suggesting quicker recovery and stabilization. All these findings were statistically significant and favor early initiation of feeding.

Table 3: Feeding Intolerance Symptoms

Symptom	Early Feeding (n=110)	Late Feeding (n=110)	p-value
Abdominal Distension	10 (9.1%)	22 (20.0%)	0.02*
Vomiting	3 (2.7%)	5 (4.5%)	0.31

*Statistically significant

Table 3 compares the occurrence of feeding intolerance symptoms between the two groups. The incidence of abdominal distension was significantly lower in the early feeding group (9.1%) compared to the late feeding group (20.0%), with a p-value of 0.02, suggesting improved gastrointestinal tolerance. Vomiting was slightly more frequent in the late group (4.5% vs. 2.7%), but the difference was not statistically significant ($p=0.31$), indicating that vomiting may not be directly linked to the timing of feeding initiation.

Discussion

This randomized controlled trial was designed to assess and compare the outcomes of early versus late trophic feeding in preterm low birth weight (LBW) neonates. The findings demonstrate that the early trophic feeding, which begins within the first 24 hours of birth life, imply great clinical benefits in comparison to late initiation. These advantages are better weight gain, less need of parenteral nutrition and hospitalization and highest tolerability of feeding.

Among the most significant findings was the fact that the early feeding group had more weight gain than late-feeding group. This finding compares to those found by other researchers over time, such as those of Sallakh-Niknezhad et al., who reported reduced time to reach the birth weight and an overall better weight increase among the newborns who were administered early feeds within the first week of life [5]. Leaf et al. have also registered similar findings and they noted that early enteral feeding enhances growth rates and it does not impose any risk of developing feeding-related complications [7]. The most likely explanation of this on physiological basis is the increased maturity of the gastrointestinal tract, early stimulation of intestinal motility as a result of early intestinal nutrition and augmented enzymatic activity [2,8].

Parenteral nutrition was also shorter in neonates receiving early trophic feeds (mean 9.26 $\pm$ 4.57 days) compared to the respective neonates in the late group (14.11 $\pm$ 6.41 days). This observation depicts an accelerated move towards complete enteral feeding. It also confirms the published evidence of Kwok et al. and Dorling et al. who revealed that early introduction of progressive enteral feeding under proper clinical monitoring, does not bring about high mortality rate and such feeding induced complications among very low birth weight (VLBW) infants [4]. Additionally, Berseth highlighted that early feeding enables adaptation of the intestines, and can shorten the condition of using a central line, which, in its turn, decreases the risk of infections [9]. It was also found that the period of hospitalization was greatly shorter in the early feeding group (12.14 $\pm$ 8.61 days) compared to the late group (21.11 $\pm$ 1.15 days) detailing the importance of early feeding in clinical stabilization and faster recovery [5]. The decrease of the hospitalization is not only associated with the increased health outcomes, it saves money and prevents the exposure to nosocomial infections. Morgan et al. also reported similar results and indicated that infants who received early minimal enteral nutrition had shorter NICU stay [10].

In the aspect of feeding tolerance, although mild signs, like distension of abdomen or vomiting, were noticed in a few cases of the early feeding group, they were more or less under control and did not need any stoppage to feeds. The maximal factors recorded in this study were 14.29 percent for neonates who had vomiting during early feeding and 47.62 percent neonates who had abdominal distension. This rate is comparable to those found by Kayastha et al., thus feeding intolerance was found in 38.18 percent of preterm neonates in a similar context [6]. Less recent studies by Patel and others confirm that mild gastrointestinal distressed symptoms are prevalent and generally, not lasting in the early-fed babies [11]. Notably, conservative management successfully

eradicated these symptoms, which proves the safety of early trophic feeding in general.

Physiologically, early enteral nutrition stimulates mucosal lining progression and differentiation, improves the immune mechanism with the creation of digestive related protein (GALT), and induces the valuable microbiota colonization [3,12]. All of these affect the enhanced digestive activity and the enhanced systematic immunity of the preterm neonate. It was also hypothesized that early feeding alters the inflammatory pathways and enhances gut barrier integrity, reducing the risk of occurrence of necrotizing enterocolitis (NEC) [13].

The results of their investigations confirm the accumulating data base in promoting the regular use of early trophic feeding in neonatal intensive care units (NICUs) with regard to clinically stable preterm infants. Early reaching of the trophic feedings may help in increasing efficiency of feeding, decrease the complications and overall neonatal outcome as emphasized by Kebede et al. [1]. Moreover, still Cochrane reviews and meta-analyses have proven that early feeding may be continued in preterm neonates, under the condition that close control and personalization are carried out [14,15].

Nevertheless, this research is limited in some way. The fact that it is carried out in one hospital of the tertiary care level may affect the generalizability of the results. Moreover, the neurodevelopmental long-term outcomes have not been evaluated in the study, and this aspect is of great concern about the further researches. It is suggested that longitudinal and multicenter studies should be carried out to clarify these results further and find out what they may imply in terms of long-range growth, cognitive development and so on the general quality of life.

Conclusion

This study demonstrates that early trophic feeding, initiated within 24 hours of birth, is a safe and effective approach for managing preterm low birth weight neonates. Infants in the early feeding group showed significantly better clinical outcomes, including greater weight gain, reduced duration of parenteral nutrition, and shorter hospital stay, compared to those who received late feeding. While mild feeding intolerance—such as abdominal distension and occasional vomiting—was more

frequent in the early group, it remained within manageable limits and did not outweigh the benefits. Early feeding supports gut maturation, enhances immune development, and promotes quicker adaptation to enteral nutrition.

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