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Research Article

Comparison of Early Versus Late Trophic Feeding in Very Low Birth Weight Preterm Neonates Presenting in a Tertiary Care Hospital

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Abstract

Objective: To compare the mean hospital stay and number of days to gain pre-specified weight of early versus late trophic feeding in very LBW preterm neonates presenting in a tertiary care hospital.

Materials and Methods: This randomized clinical trial was conducted in department of Pediatric Medicine, Services Hospital, Lahore from 30-4-2019 to 30-10-2019. Sixty children fulfilling the inclusion criteria were included in the study and were randomly divided in two groups by simple lottery method. In group A, neonates received enteral feeding within the first 48 hours after birth. In group B, neonates received enteral feeding after 72 hours of birth. Time taken to achieve normal birth weight of particular gestational age was noted. Total hospital stay was also observed till discharge of neonate. Data was collected on a standardized proforma. Data was entered and analyzed using SPSS version 20.

Results: In early feeding group, the mean age of neonates was 25.43 ± 13.99 hours. In late feeding group, the mean age of neonates was 25.17 ± 11.08 hours. In early feeding group, there were 17 (56.7%) male and 13 (43.3%) female neonates. In late feeding group, there were 14 (46.7%) male and 16 (53.3%) female neonates. In early feeding group, the mean time to achieve optimal weight was 12.47 ± 1.85 days. In late feeding group, the mean time to achieve optimal weight was 20.63 ± 2.81 days. In early feeding group, the mean hospital stay was 13.27 ± 1.70 days. In late feeding group, the mean hospital stay was 22.13 ± 2.70 days. The difference is statistically significant ($p < 0.05$).

Conclusion: It is concluded that early trophic feeding of very LBW preterm neonates will be more helpful in attaining optimal weight as well as reducing hospital stay as compared to late feeding group.

Keywords: *Hospital Stay; Early Feeding; Late Feeding; Trophic Feeding; Very Low Birth Weight; Preterm Neonates*

Introduction

Every year, > 2 million infants are born weighing < 2.5 kg, over 96% of them in developing countries. These low-birth-weight infants are at increased risk of early growth retardation, infections, developmental delay and death during infancy and childhood. Very-low-birth-weight infants, those weighing < 1.5 kg, are particularly vulnerable to these adverse outcomes [1]. In Pakistan, the incidence of very LBW is about 1.04% [2]. Feeding very LBW or very preterm infants poses a unique challenge due to the immaturity of gastrointestinal tract. Early

nutrition is crucial for improving optimal growth, long-term outcome and to decrease morbidities [3]. Beneficial effects of human milk in improvement of host defense, digestion and absorption of nutrients, neurodevelopment, gastrointestinal function as well as psychological effects, makes it suitable for meeting essential needs of premature neonates; whereas enteral feedings in very LBW or sick preterm neonates are often delayed for several days or weeks after birth because of respiratory compromise or risk of necrotizing enterocolitis; wisdom of withholding enteral nutrition in preterm neonate has been questioned from last 3 decades [4,5].

Early trophic feeding, giving neonates very small volumes of milk during the first week after birth, may promote intestinal maturation, enhance feeding tolerance and decrease time to reach full enteral feeding [4]. Trophic feeding of preterm infants was introduced in the late 1980s in an attempt to overcome the lack of gastrointestinal stimulation during total parenteral nutrition. Alternative names include gut priming, minimal enteral nutrition and early hypocaloric feeding [3]. The optimal duration of trophic feeding is difficult to recommend, and rather than to specify a set time, it is probably more sensible to suggest continuing trophic feeding until the infant can safely tolerate substantial volumes of milk. Breast milk, if available, should be preferred to formula [6]. A randomized trial conducted in very LBW preterm neonates showed that with early feeding, mean time to gain birth weight was 13.75 ± 5.21 days while it was 20.53 ± 6.31 days with late feeding ($P < 0.001$) and mean hospital stay was 12.14 ± 8.61 days with early feeding while 21.11 ± 1.15 days with late feeding ($P < 0.001$) [7].

Rationale of study is to assess the outcome of early versus late trophic feeding in very LBW preterm neonates presenting in a tertiary care hospital. Literature has shown that early feeding is beneficial as compared to late feeding. But very few research work has been done in this regard and not sufficient local evidence is found in literature which can help us to determine the beneficial role of early trophic feeding. So, through this study we want to get the local evidence. This will help to improve our practice and will also help to improve patient care and health in future.

Objectives of the Study

To compare the mean hospital stay and number of days to gain pre-specified weight of early versus late trophic feeding in very low birth weight preterm neonates presenting in a tertiary care hospital.

Materials and Methods

This randomized controlled trial was conducted at Department of Pediatric Medicine, Services Hospital Lahore from April 2019 to October 2019. Non probability, consecutive sampling followed by simple random sampling was used. Sample size of 60 cases; 30 cases in each group is calculated with 95% confidence level, 80% power of study and taking magnitude of mean time to gain birth weight i.e. 13.75 ± 5.21 days with early treatment and 20.53 ± 6.31 days with delayed treatment in very LBW preterm neonates. Preterm neonates presenting within 48 hours of birth of either gender with very LBW were included. Neonates with birth asphyxia (APGAR<6 at 5 minutes of birth), sepsis, congenital heart disease, meconium aspiration syndrome or congenital anomaly including neural tube defect (on clinical examination) were excluded.

Sixty children fulfilling the inclusion criteria were included in the study from Department of Pediatrics, Services Hospital, Lahore. Informed consent was taken from each patient. Demographic detailed like name, age* (in hours), gestational age at birth, gender and birth weight were noted. Then neonates were randomly divided in two groups. In group A, neonates received enteral feeding within the first 48 hours after birth. In group B, neonates received enteral feeding after 72 hours of birth. All these neonates were admitted in pediatric ward and were followed-up there till discharge. Birth weight for preterm infants at a specific age is considered normal or optimal when it is equivalent for intrauterine rates at that specific age calculated via "Fenton sex specific growth charts for preterm infants". Time taken to achieve normal birth weight of particular gestational age was noted. Total hospital stay was also observed till discharge of neonate. Data collected on a standardized proforma.

Data analysis

Data was entered and analyzed using SPSS version 20. Quantitative variables like age, gestational age, birth weight, time to achieve birth weight and hospital stay are presented by mean and SD. Qualitative variables like gender were presented by frequency and percentage. Both groups were compared by using independent sample t-test for outcome (time to achieve birth weight and hospital stay). P-value ≤ 0.05 is taken as significant. Data was stratified for age, gender, gestational age and birth weight. Post-stratification, independent sample t-test was applied with p-value ≤ 0.05 taken as significant.

Results

In early feeding group, the mean age of neonates was 25.43 ± 13.99 hours while in late feeding group, the mean age of neonates was 25.17 ± 11.08 hours. In early feeding group, there were 17 (56.7%) male and 13 (43.3%) female neonates while in late feeding group, there were 14 (46.7%) male and 16 (53.3%) female neonates. In early feeding group, the mean birth weight of neonates was 1221.70 ± 120.10 grams. In late feeding group, the mean birth weight of neonates was 1177.13 ± 134.22 grams. In early feeding group, the mean gestational age at birth was 32.00 ± 2.74 weeks. In late feeding group, the mean gestational age at birth was 32.30 ± 2.82 weeks.

In early feeding group, the mean time to achieve optimal weight was 12.47 ± 1.85 days. In late feeding group, the mean time to achieve optimal weight was 20.63 ± 2.81 days. The difference is statistically significant ($p < 0.05$) (Table 1).

Early feeding		Group	
		Late feeding	
Time (days)	N	30	30
	Mean	12.47	20.63
	SD	1.85	2.81
	Minimum	10	16
	Maximum	15	25

Table 1: *Comparison of time to achieve optimal birth weight in both groups.*

Independent Samples t-test = 13.292.

P-value = 0.000 (Significant).

In early feeding group, the mean hospital stay was 13.27 ± 1.70 days. In late feeding group, the mean hospital stay was 22.13 ± 2.70 days. The difference was significant ($p < 0.05$) (Table 2).

Early feeding		Group	
		Late feeding	
Hospital stay (days)	N	30	30
	Mean	13.27	22.13
	SD	1.70	2.70
	Minimum	10	17
	Maximum	16	26

Table 2: *Comparison of hospital stay in both groups.*

Independent Samples t-test = 15.218.

P-value = 0.000 (Significant).

Data was stratified for age of neonates. In neonates aged 1-24 hours, the mean time to achieve optimal weight was 12.80 ± 1.97 days with early feeding and 21.00 ± 2.57 days with late feeding. In neonates aged 25-48 hours, the mean time to achieve optimal weight was 12.13 ± 1.73 days with early feeding and 20.31 ± 3.05 days with late feeding. The difference was highly significant in both groups for each strata ($p < 0.05$) (Table 3).

Age (hours)	Time (days)	Group		P-value
		Early feeding	Late feeding	
1-24	N	15	14	0.000
	Mean	12.80	21.00	
	SD	1.97	2.57	
25-48	N	15	16	0.000
	Mean	12.13	20.31	
	SD	1.73	3.05	

Table 3: *Comparison of time to achieve optimal birth weight in both groups stratified for age.*

Regarding hospital stay data was stratified for age of neonates. In neonates aged 1-24 hours, the mean hospital stay was 13.60 ± 1.77 days with early feeding and 22.71 ± 2.23 days with late feeding. In neonates aged 25-48 hours, the mean hospital stay was 12.93 ± 1.62 days with early feeding and 21.63 ± 3.03 days with late feeding. The difference was highly significant in both groups for each strata ($p < 0.05$) (Table 4).

Age (hours)	Hospital stay (days)	Group		P-value
		Early feeding	Late feeding	
1-24	N	15	14	0.000
	Mean	13.60	22.71	
	SD	1.77	2.23	
25-48	N	15	16	0.000
	Mean	12.93	21.63	
	SD	1.62	3.03	

Table 4: *Comparison of hospital stay in both groups stratified for age.*

Data was stratified for gender of neonates. In male neonates, the mean time to achieve optimal weight was 12.47 ± 1.70 days with early feeding and 20.14 ± 2.98 days with late feeding. In female neonates, the mean time to achieve optimal weight was 12.46 ± 2.11 days with early feeding and 21.06 ± 2.67 days with late feeding. The difference was highly significant in both groups for each strata ($p < 0.05$) (Table 5).

Gender	Time (days)	Group		P-value
		Early feeding	Late feeding	
Male	N	17	14	0.000
	Mean	12.47	20.14	
	SD	1.70	2.98	
Female	N	13	16	0.000
	Mean	12.46	21.06	
	SD	2.11	2.67	

Table 5: *Comparison of time to achieve optimal birth weight in both groups stratified for gender.*

Data was stratified for gender of neonates. In male neonates, the mean hospital stay was 13.29 ± 1.36 days with early feeding and 21.64 ± 2.76 days with late feeding. In female neonates, the mean hospital stay was 13.23 ± 2.13 days with early feeding and 22.56 ± 2.66 days with late feeding. The difference was highly significant in both groups for each strata ($p<0.05$) (Table 6).

Gender	Hospital stay (days)	Group		P-value
		Early feeding	Late feeding	
Male	N	17	14	0.000
	Mean	13.29	21.64	
	SD	1.36	2.76	
Female	N	13	16	0.000
	Mean	13.23	22.56	
	SD	2.13	2.66	

Table 6: *Comparison of hospital stay in both groups stratified for gender.*

Data was stratified for birth weight of neonates. In neonates having birth weight 1000-1250 grams, the mean time to achieve optimal weight was 12.50 ± 2.01 days with early feeding and 20.42 ± 2.82 days with late feeding. In neonates having birth weight 1251-1500 grams, the mean time to achieve optimal weight was 12.42 ± 1.68 days with early feeding and 21.00 ± 2.90 days with late feeding. The difference was highly significant in both groups for each strata ($p < 0.05$) (Table 7).

Birth weight (grams)	Time (days)	Group		P-value
		Early feeding	Late feeding	
1000-1250	N	18	19	0.000
	Mean	12.50	20.42	
	SD	2.01	2.82	
1251-1500	N	12	11	0.000
	Mean	12.42	21.00	
	SD	1.68	2.90	

Table 7: *Comparison of time to achieve optimal birth weight in both groups stratified for birth weight.*

Data was stratified for birth weight of neonates. In neonates having birth weight 1000-1250 grams, the mean hospital stay was 13.22 ± 1.87 days with early feeding and 22.11 ± 2.62 days with late feeding. In neonates having birth weight 1251-1500 grams, the mean hospital stay was 13.33 ± 1.50 days with early feeding and 22.18 ± 2.96 days with late feeding. The difference was highly significant in both groups for each strata ($p < 0.05$) (Table 8).

Birth weight (grams)	Hospital stay (days)	Group		P-value
		Early feeding	Late feeding	
1000-1250	N	18	19	0.000
	Mean	13.22	22.11	
	SD	1.87	2.62	
1251-1500	N	12	11	0.000
	Mean	13.33	22.18	
	SD	1.50	2.96	

Table 8: *Comparison of hospital stay in both groups stratified for birth weight.*

Data was stratified for gestational age at birth. In neonates born during 28-31 weeks, the mean time to achieve optimal weight was 12.67 ± 2.06 days with early feeding and 20.45 ± 3.36 days with late feeding. In neonates born during 32-36 weeks, the mean time to achieve optimal weight was 12.27 ± 1.67 days with early feeding and 20.74 ± 2.54 days with late feeding. The difference was highly significant in both groups for each strata ($p<0.05$) (Table 9).

Gestational age (weeks)	Time (days)	Group		P-value
		Early feeding	Late feeding	
28-31	N	15	11	0.000
	Mean	12.67	20.45	
	SD	2.06	3.36	
32-36	N	15	19	0.000
	Mean	12.27	20.74	
	SD	1.67	2.54	

Table 9: *Comparison of time to achieve optimal birth weight in both groups stratified for gestational age.*

Data was stratified for gestational age at birth. In neonates born during 28-31 weeks, the mean hospital stay was 13.22 ± 1.92 days with early feeding and 22.18 ± 3.25 days with late feeding. In neonates born during 32-36 weeks, the mean hospital stay was 12.93 ± 1.44 days with early feeding and 22.11 ± 2.42 days with late feeding. The difference was highly significant in both groups for each strata ($p < 0.05$) (Table 10).

Gestational age (weeks)	Hospital stay (days)	Group		P-value
		Early feeding	Late feeding	
28-31	N	15	11	0.000
	Mean	13.60	22.18	
	SD	1.92	3.25	
32-36	N	15	19	0.000
	Mean	12.93	22.11	
	SD	1.44	2.42	

Table 10: *Comparison of hospital stay in both groups stratified for gestational age.*

Discussion

Early trophic feeding, giving neonates very small volumes of milk during the first week after birth, may promote intestinal maturation, enhance feeding tolerance and decrease time to reach full enteral feeding independently of parenteral nutrition [8,9].

The introduction of enteral feeds for LBW neonates are often delayed due to concern that early introduction may not be tolerated and may increase the risk of necrotizing enterocolitis. However, enteral fasting may diminish the functional adaptation of the immature gastrointestinal tract and prolong the need for parenteral nutrition with infectious and metabolic risks [10].

Advanced neonatal cares, improved survival of preterm neonates and necessity of providing adequate nutritional regimes has made feeding strategies as one of the major clinical challenge for neonatal intensive care unit staff. Because of excess prematurity, very LBW preterm neonates are not often able to be directly breast fed and prolonged parenteral nutrition will predispose them to sepsis and phlebitis [11-13].

A randomized trial conducted in very LBW preterm neonates showed mean time to gain birth weight was 13.75 ± 5.21 days with early feeding and 20.53 ± 6.31 days with late feeding (P < 0.001), while mean hospital stay was 12.14 ± 8.61 days with early feeding and 21.11 ± 1.15 days with late feeding (P < 0.001) [7].

Although several studies have verified the potential benefits of trophic feeding, there is no general agreement about the optimal timing to start enteral feeds [8,9,14]. A systematic review has revealed that only time to full enteral feeding, number of days that feedings were withheld and total hospital stay were significantly reduced following trophic feeding but there is still uncertainty about the exact time of starting minimal enteral feeding [14].

Another review assessed all studies of parenterally fed LBW preterm neonates to determine the effects of early enteral feedings initiated shortly after birth compared to delayed enteral feedings [10]. Results of two included studies in analyses revealed that early feeding had no significant effect on weight gain, necrotizing enterocolitis, mortality, or age at discharge, although important effects cannot be excluded with the small number of patients studied [1]. Bombell S, McGuire W. 2009 in their review concludes that early trophic feeding did not provide any evidence to affect feed tolerance or growth rates in very LBW neonates [13].

Considering all these results benefits and hazards of early versus delayed initiation of enteral feedings in parenterally fed preterm LBW neonates, the effects on major clinical outcome remained uncertain [10,13].

In our study, the mean time to achieve optimal weight was 12.47 ± 1.85 days with early feeding and 20.63 ± 2.81 days with late feeding. The difference was significant (p < 0.05). The mean hospital stay was 13.27 ± 1.70 days with early feeding and 22.13 ± 2.70 days with late feeding. The difference was statistically significant (p < 0.05).

Conclusion

It is concluded that early trophic feeding of very LBW preterm neonates will be more helpful in attaining optimal weight in early duration as compared to late feeding. Now we have got the local evidence and found early feeding to be more reliable than late feeding. Now in future, we suggest to implement the practice of early feeding in local setting. This will help to improve our practice and will also help to improve patient care and health in future.

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