Original Article

Comparison of Slow versus Rapid Feeding Regimen in Preterm Neonates in the reduction of hospital stay

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Abstract

Introduction: In preterm babies delay in the achievement of full feeds causes prolonged hospital stay. This study will help in the nutritional management of preterm babies which will shorten the hospital stay and reduce the economic burdens on parents.

Objective: To compare the mean duration of hospital stay of preterm neonates with two different feeding protocols(slow feeding regimen versus rapid feeding regimen).

Materials and Methods: This study was conducted in the neonatal unit at Izzat Ali Shah Hospital from October 2019 to March 2020 through a randomized controlled trial. A total of 102 (51 in each group) were randomized to slow feeding (Group A) and Rapid feeding(Group B). Depending on the birth weight and gestational age, a certain amount of breast milk was initiated, with increments of 15-20 mL/kg/day in the slow feeding group & 25-30 ml/kg/day in the rapid feeding group. Feeding was stopped temporarily in case of any sign of feeding intolerance, suspected necrotizing enterocolitis, recurrent apnoeic episodes, and neonatal seizures. The total target feed was 180 ml/kg per day. Infants were continued in the study until discharged from the hospital.

Results: Our study shows that the mean gestational agein Group A (Slow feeding) was 34 weeks with SD ± 2.68 while the mean gestational agein Group B (Rapid feeding) was 35 weeks with SD ± 1.98. In Group A (Slow feeding) 55% of neonates were male while 45% of neonates were female. Whereas in Group B (Rapid feeding) 57% of neonates were male while 43% of neonates were female. In Group A (Slow feeding) mean hospital stay was 22 days with SD ± 7.02. In Group B (Rapid feeding) mean hospital stay was 13 days with SD ± 3.72.

Conclusion: Our study concludes that mean hospital stay in the rapid advancement of feeds was shorter as compared to the slow feeding of preterm neonates.

Keywords: Hospital stay, rapid advancement, slow feeding, preterm neonates.

Introduction

Adequate nutrition is essential for the optimal growth and health of preterm neonates. Preterm birth is defined by the World Health Organization (WHO) as all births before 37 completed weeks of gestation.[1] South Asia has the highest burden of preterm births. Pakistan is fourth in the top 10 countries that represent 60% of the world's preterm births.[2] Most of the babies born preterm have a low birth weight (LBW). LBW is defined as weight at birth of fewer than 2500 grams.[3]

The perinatal period is crucial for human development.[4] Optimum nutrition improves growth and neurological outcomes, reduces the incidence of sepsis, and perhaps even retinopathy of prematurity.[5] Care of preterm babies is often associated with prolonged hospitalization and increased economic burdens on the family and society.[5] Feeding is a profound factor that contributes to the length of NICU stay in premature neonates, therefore appropriate and tolerable feeding strategies are effective in reducing the need for parenteral nutrition, earlier removal of vascular catheters, short hospital stay, and decrease the risk of nosocomial infections.[6] Breast milk is the first choice for all newborns. In case of unavailability of breast milk pre-term formula milk can be used for pre-term infants.[7] Enteral feeding should be initiated as soon as clinically feasible.[8] The essential objective is to reach full enteral feeding in the shortest possible duration while maintaining growth and optimum nutrition and avoiding the negative consequences of rapid feeding.[9]

Controversy exists regarding the increment of enteral feeds. The advocates of slow feed advancements have quoted the risk of necrotizing enterocolitis in their defense, while supporters of rapid advancements have cited better growth and shorter hospital stay in their defense.[10] Slow feeding progress can delay the establishment of full feeding and may be associated with metabolic and infectious morbidities secondary to prolonged exposure to parenteral nutrition.[11] The study conducted by Kadam et al concluded that the duration of hospital stay was shorter in the rapid feeding group as compared to the slow feeding group with statistic values of 31.4 (17.1) and 22.58 (14.1) respectively.[10]

Despite the fact that the prevalence of preterm births is very high in Pakistan and delay in the achievement of full feeds causes prolonged hospital stay, no such studies have been done to date. The results of this study will help in the proper nutritional management of preterm babies and that will shorten the hospital stay and reduce the economic burdens on parents.

Materials and Methods

The study objective was to compare the mean duration of hospital stay of preterm neonates with two different feeding protocols (slow feeding regimen versus rapid feeding regimen).

Slow Feeding Regimen Group was defined as the group that was receiving feed advancements by volumes of 15-20 ml/kg/day until the achievement of maximum feeds of 180 ml/kg/day. While Rapid Feeding Regimen Group was defined as the group that was receiving feed advancements by volumes of 25-30 ml/kg/day until the achievement of maximum feeds of 180 ml/kg/day. The duration of Hospital Stay was calculated as the number of days from the day of admission in the NICU till the discharge. Criteria for discharge were the attainment of full feeds (180ml/kg/day). The study was conducted in the neonatal unit at Izzat Ali Shah Hospital from October 2019 to March 2020 through a randomized controlled trial. The sample size was calculated by using open epi sample size calculator as follows: Level of significance=5%, Power=80%, Pooled SD=15.6, Group A[10] Mean=31.34, SD=17.1, GroupB[10] Mean=22.58, SD14.1, Sample size= 51 patients in each group.

The technique of sampling was non-probability consécutive sampling.

The Inclusion Criteria for the study was preterm infants <37 weeks of gestation and infants fit to receive enteral feeds (clinically stable). The exclusion criteria were congenital malformations (e.g cleft palate, cyanotic congenital heart disease, intestinal atresia, gastroschisis or omphalocele), infants who had severe birth asphyxia (grade III), delayed initiation of feeds for more than 5 days for any other complication, infants not fit for enteral nutrition (Abdominal distention, vomiting, GI bleeding) and critically ill neonates requiring respiratory support.

The study was carried out after the approval of the Institutional Ethical Committee. Informed consent was taken from the parents. After a detailed history and clinical examination infants fulfilling the inclusion criteria were randomly allocated by lottery method to two groups i.e slow feeding (Group A) and Rapid feeding (Group B). All the data was recorded in a predesigned proforma. In both groups feeding was initiated on the first day of life. Expressed breast milk was the nutrition of choice & if it was not available then preterm formula milk was used. Strict feeding

protocol was followed for all study infants. Depending on the birth weight and gestational age, a certain amount of breast milk was initiated, with increments of 15-20 mL/kg/day in the slow feeding group and 25-30 ml/kg/day in the rapid feeding group. Feeds were given by trained staff as bolus feeds via intragastric or oral feeds at intervals of two hours. Feeding was stopped temporarily in case of any sign of feeding intolerance, necrotizing enterocolitis, recurrent apnoeic episodes, and neonatal seizures. These neonates were excluded from the study. Besides enteral feeding appropriate parenteral nutrition was continued until enteral feed volumes of 100ml/kg/day were achieved. Oral intake of 180 mL/kg per day was defined as full feed. Infants were continued in the study until discharged from the hospital.

All data was entered and analyzed using SPSS version 16. For quantitative variables (Gestational age, Birth weight, Duration of hospital stay) mean and S.D was calculated. For comparison of quantitative variables between two groups independent sample t-test was used. P-value <0.05 was considered statistically significant. Qualitative variables like gender were measured as frequency and percentage. Effect modifiers like gestational age, gender, and birth weight were controlled by stratification. A post-stratification independent sample t-test was applied.

Results

In this study gestational age among 102 neonates was analyzed as in Group A (Slow feeding), 19 (37%) neonates had a gestational age range of 30-33 weeks while 32 (63%) neonates had a gestational age range of 34-36 weeks. The mean gestational age was 34 weeks with SD ± 2.68. Whereas in Group B (Rapid feeding) 18 (35%) neonates had a gestational age range of 30-33 weeks while 33 (65%) neonates had a gestational age range of 34-36 weeks. The mean gestational age was 35 weeks with SD ± 1.98. (Table 1)

Gender distribution among 102 neonates was analyzed as in Group A (Slow feeding) 28 (55%) neonates were male while 23 (45%) neonates were female. Whereas in Group B (Rapid feeding) 29 (57%) neonates were male while 22 (43%) neonates were female. (Table 2)

Birth weight distribution among 102 neonates was analyzed as in Group A (Slow feeding) 14 (27%) neonates had birth weight <1.5 kg and 37 (72%) neonates had a birth weight range of 1.5-2.5 Kg. The mean birth weight was 1.7 kg with SD ± 1.23. In Group B (rapid feeding) 13 (25%) neonates had birth weight <1.5 kg and 38 (75%) neonates had a birth weight range of 1.5-2.5 Kg. The mean birth weight was 1.5 kg with SD ± 1.16. (Table 3)

Mean hospital stay among 102 neonates was analyzed as in Group A (Slow feeding) mean hospital stay was 22 days with SD ± 7.02. In Group B (Rapid feeding) mean hospital stay was 13 days with SD ± 3.72. (Table 4)

Stratification of mean hospital stay with respect to age, gender, birth weight is given in Table 5, 6 & 7.

Group A: Slow feeding

Group B: Rapid feeding

Table 1: Demographic details

		Group A	Group B	P-Value
Gestational Age	**30-33 weeks**	19 (37%)	18 (35%)	0.0345
	34-36 weeks	32 (63%)	33 (65%)	
Gender	**Male**	28 (55%)	29 (57%)	0.8419
	Female	23 (45%)	22 (43%)	
Birth weight	**< 1.5 kg**	14 (27%)	13 (25%)	0.4002
	1.5-2.5 Kg	37 (72%)	38 (75%)	
	Mean and SD	1.7 Kg SD ± 1.23	1.5 Kg SD ± 1.16	

(n=102)

Table 2: Stratification of Duration of Hospital with respect to gestational age, gender, and birth weight

		GROUP A	GROUP B	P-Value
Duration of Hospital	**Mean and SD**	22 days ± 7.02	13 days ± 3.72	0.0001
Gestational Age	**30-33 weeks**	23 days ± 7.18	14 days ± 3.56	0.0001
	34-36 weeks	21 days ± 7.23	13 days ± 3.47	
Gender	**Male**	21 days ± 7.30	12 days ± 3.38	0.0001
	Female	22 days ± 7.25	12 days ± 3.46	
Birth Weight	**< 1.5 kg**	23 days ± 7.21	14 days ± 3.52	0.0001
	1.5-2.5 Kg	21 days ± 7.28	12 days ± 3.40	

Discussion

This study has compared the slow and rapid advancement of feeds in preterm babies and outcome has been measured in terms of duration of hospital stay. If during the trial, the baby developed any other complication which interfered with the feeding regimen, they were excluded from the study. The babies who received rapid advancement of feed had a shorter stay in the hospital.

Similar results were observed in another study conducted by Kadam et al in which the time to gain the birth weight was less in the rapid feeding group. The duration of hospital stay (22 days in rapid feeding group versus 31 days in slow feeding group) and requirement of parenteral nutrition was less in the rapid feeding group and similarly, the risk of feed intolerance or necrotizing enterocolitis did not increase in the rapid feeding group.[10]

In another study, Krishnamurthy S et al used 30 ml/kg/day feed in a rapid feeding group and found a shorter length of stay as compared to the slow feeding group (median 9.5 days vs. 11 days) (p=0.003). These babies also regained birth weight quicker.[11] Salhotraand Caple et al also found a similar finding with shorter length of stay in the rapid advancement group of neonates (10 +/- 1.8 days) and also the babies regained birth weight earlier (median 18 days) than the slow feeding group.[12,13]

Karagol et al did the randomised controlled trial to do a comparison between slow and rapid enteral feeding in preterm neonates. The rapid feeding enhancement group achieved earlier full enteral feed. The babies also required fewer days of parenteral nutrition, lesser time to regain birth weight, and shorter hospital stay.[14] Similar findings were also observed in the Ahmed el al study.[15] Jain et al looked at the comparison of slow with rapid enteral feeding in preterm neonates with the antenatal absent end-diastolic flow. This trial did not find any increased incidence of feed intolerance or necrotizing enterocolitis in the rapid feeding group.[16] Nangia et al in their study also found early achievement of full feed and lesser hospital stay in the early total enteral feeding group.[17]

The main strength of our study is that the sample size was sufficient and adequate power was there to see the difference. The limitation of the study is that it mainly examined the duration of hospital stay in the two comparative groups and did not look at the other factors like regaining birth weight, the incidence of necrotizing enterocolitis[18] and risk of sepsis, etc.

Conclusion

This study concludes that mean hospital stay in the rapid advancement of feeds (25-30 ml/kg/day) is shorter as compared to slow feeding (15-20 ml/kg/day) in stable preterm neonates.

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