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A comparative study to assess the weight gain among breast-fed, formula-fed and mix-fed preterm babies

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Abstract

Body weight is a crucial indicator of a baby's development and growth. The connection between nursing and body weight is extremely important for the health of newborns. This study compares the weight gain among breastfed, formula-fed, and mixed-fed preterm babies (weight between 1-2 kilograms) admitted to the neonatal ICU of the Indraprastha Apollo hospital in New Delhi. Thirty-five newborn babies, ranging in age from 28 to 35 weeks, with a weight of 1-2 kg, were selected using the purposive sampling technique. The data collection was done for 3 months, from August to October 2022, by biomarkers and in vivo weight measurement. The weight was assessed for 17 days following the commencement of the first feed, and the weight was measured at the same time every day. The demographic characteristics of the sample revealed that 54.28 percent of the newborns included in the study were born in Apollo hospitals. Out of 35 babies, 31 were born through a cesarean session and the remaining four through a complicated vaginal delivery. The majority of the babies are between 34 and 35 weeks of gestation. The most common maternal complications observed were hypertension and oligohydramnios, and only a few neonates had fetal complications. The inferential analysis showed that there was no significant weight gain among the three categories during the first 17 days of feeding. The study can be repeated in different settings with more stringent inclusion criteria and for a longer duration.

Keywords: Preterm newborn; Weight gain; Breastfed; Formula fed; Mixed fed

1. Introduction

Body weight is an important sign of a baby's growth and development. Neonates lose weight as a result of the extracellular fluid diuresis that occurs naturally after they leave the uterus [1]. The relationship between breastfeeding and body weight is crucial for the wellbeing of neonates. Despite studies showing substantial evidence in favour of breastfeeding, there isn't a consensus among medical professionals about the weight increase of breastfed and formula-fed newborns. After identifying whether the newborn is exhibiting delayed weight gain or a failure to thrive, proper support should be given when weight gain happens gradually [2,3]. Infants who are breastfed have different growth patterns than those who are fed formula, and by the age of 12 months, formula-fed children weigh 400–600 g more on average than breastfed infants do [4,5]. Small sample numbers and a variety of methodologies have made it difficult to assess the impact of newborn feeding on body composition, and different research has produced contradictory findings about the direction and strength of the effect [6,7]. The range of postnatal ages at which measurements have been taken has further complicated comparisons across individual research because body composition changes quickly and non-linearly within the first year of life [8].

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2. Material and methods

The study was designed as a comparative study to assess the weight gain among breastfed, formula-fed and mix-fed preterm babies (weight between 1-2 kilograms) admitted to the neonatal ICU of Indraprastha Apollo hospital in New Delhi. The objectives of the study were;

2.1. Primary Objectives

- To assess the weight gain among breastfed preterm babies admitted to neonatal ICU.
- To assess the weight gain among formula-fed preterm babies admitted into neonatal ICU.
- To assess the weight gain among mix-fed preterm babies admitted into the neonatal ICU.

2.2. Secondary Objective

To assess the change in weight among breastfed and formula-fed preterm babies admitted in neonatal ICU.

The sampling done by purposive sampling technique, 35 preterm babies were included in the study who are satisfying the inclusion criteria. The inclusion criteria are Preterm babies who are admitted during the time of data collection and Preterm who have a weight of 1-2kg. An informed consent was obtained from the guardian of the newborn explaining all the data collection processes and ethical considerations.

The data collection was done for 3 months from August to October 2022 and data was obtained from 35 samples. The data collection was done by bio- markers- in vivo- weight measurement. The weight was assessed for 16 days following the commencement of the first feed and the weight is measured at the same time every day.

3. Results

The results were discussed in two divisions-the frequency and percentage distribution of the demographic data and the inferential analysis based on the objectives.

The Frequency and Percentage Distribution of Formula fed, Mix Fed and Expressed Breast milk fed babies are shown in figures and tables given below.

Table 1 Percentage and Frequency distribution of the sample based on sample characteristics

Demographic variable		Mix Fed (n=12)	Percentage	Breast Fed (n=12)	Percentage	Formula Fed (n=11)	Percentage
Birth Place	Birth in Apollo	10	28.57%	4	11.42%	5	14.28%
	Birth outside Apollo	2	5.714%	8	22.85%	6	17.14%1
					0		0
Type of Delivery	NVD	0	0	0	0	0	0
	VD with Complications	3	8.57%	1	2.85%	0	0
	LSCS	9	25.71%	11	31.42%	11	31.42%
Gestational Age	28 weeks		0		0	1	2.85%
	30 weeks	0	0	4	11.42%	0	0
	31 weeks	3	8.57%	1	2.85%	0	0
	32 weeks	1	2.85%	2	5.71%	4	11.42%
	33 weeks	1	2.85%		0	2	5.71%

	34 weeks	3	8.57%	3	8.57%	2	5.71%
	35 weeks	4	11.42%	2	5.71%	2	5.71%
Maternal Complications	Pre-Eclampsia	2	5.71%	1	2.85%	2	5.71%
	Eclampsia	0	0	1	2.85%	1	2.85%
	PROM	0	0	1	2.85%	3	8.57%
	Oligo Hydramnios	0	0	1	2.85%	0	0
	PIH	0	0	1	2.85%	0	0
	Poly Hydramnios	0	0	1	2.85%	0	0
	Others	2	5.71%	0	0	2	5.71%
			0				
Fetal Complications	RDS	0	0	1	2.85%	0	0
	Pre Maturity	0	0	1	2.85%	0	0
	Duodenal Atresia	0	0	1	2.85%	0	0
	Severe SGA	0	0	0	0	1	2.85%

Table 1 shows that 19 neonates out of 35 born and treated in Apollo hospital and majority (31/35) was born through a Cesarean session. Most (28/35) of the neonates are born on or after 31 weeks of gestational age. 19 babies born with some of the maternal complications like eclampsia, pre-eclampsia, PIH, poly and oligohydramnios and only four neonates born with some associated fetal complications.

The comparison of weight gains in 6-10 days ,11-15 days and 16-17 days is given in the below table.

Table 2 Comparison of weight gain during 6-10 days of the treatment

	Group 1 EBM	**Group 2 Formula Fed**	**Group 3 Mix Fed**	**Total**
N	12	11	12	35
∑X	0.272	0.529	1.39	2.191
Mean	0.0227	0.0481	0.1158	0.063
$\sum X^2$	0.1518	0.0646	0.4945	0.7109
Std.Dev.	0.1151	0.0626	0.1741	0.1299

Source	***SS***	***df***	***MS***
Between-treatments	0.0555	2	0.0277
Within-treatments	0.5183	32	0.0162
Total	0.5738	34	

F = 1.71189 P Value=0.196644

Table 2,3,4 show that none of the above mentioned 'p values' are significant at 0.05 level. The analysis revealed that there is no significant difference in weight gain among the breast-fed, formula-fed and mix-fed pre-term babies in the first fifteen days of neonatal life.

Table 3 Comparison of weight gain during 11-15 days of the treatment

	Group 1 EBM	**Group 2 Formula Fed**	**Group 3 Mix Fed**	**Total**
N	12	11	12	35
∑X	0	0.215	1.928	2.143
Mean	0	0.0195	0.1607	0.061
$\sum X^2$	1.1587	0.6789	0.6588	2.4964
Std.Dev.	0.3246	0.2598	0.1781	0.2638

Source	***SS***	***df***	***MS***
Between-treatments	0.1828	2	0.0914
Within-treatments	2.1824	32	0.0682
Total	2.3652	34	

F = 1.33982 P Value=0.27619

Table 4 Comparison of weight gain during 16-17 days of the treatment

	Group 1 EBM	**Group 2 Formula Fed**	**Group 3 Mix Fed**	**Total**
N	12	11	12	35
∑X	0.684	0.212	-0.781	0.115
Mean	0.057	0.0193	-0.0651	0.003
$\sum X^2$	0.1059	0.0114	1.0228	1.1401
Std.Dev.	0.078	0.0271	0.2973	0.1831

Source	**SS**	**df**	**MS**
Between-treatments	0.0935	2	0.0468
Within-treatments	1.0462	32	0.0327
Total	1.1397	34	

F = 1.43031 P Value=0.25412

4. Discussions

The study was conducted to identify the significant weight gain among breastfed, formula-feed, and mix-fed preterm babies so that the findings may help in evidence-based practice to determine which kind of feeding is beneficial for the preterm neonates to gain weight at a pace. The demographic characteristics of the sample are well described in the tables and columns given in the analysis part, and it shows that 19 out of 35 (54.28%) babies were born in the Apollo hospital. Out of 35 babies, 31 were born through a caesarean session, and the remaining three were born through a complicated vaginal delivery. The majority of the babies belong to 34–35 weeks of gestation. The common maternal complications observed were maternal hypertension and oligohydramnios. Comparatively, very few neonates were having fetal complications.

The inferential analysis says that there is no significant weight gain among the three categories during the first 17 days of feeding.

5. Conclusion

The study stated that there is no significant difference in the weight of the babies who are breastfed, formula-fed, or mixed-fed. The same study can be repeated in different settings with more stringent inclusion criteria and for a longer duration to see the results.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest in publishing this paper.

Statement of ethical approval

Permission from the Group Director of Nursing, Assistant Director of Nursing, Head of the Neonatology Department, and the institutional ethical committee (IAH-BMR-081/08-22) was obtained before collecting the data.

Statement of informed consent

Informed consent was obtained from all the parents and guardians of the newborn babies included in the study.

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