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FACTORS AFFECTING SIGNIFICANT WEIGHT LOSS IN EXCLUSIVELY BREAST FED TERM BABIES IN A URBAN SETUP

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Abstract

Background: Newborns are expected to have weight loss in the first few days of life, and there are various putative mechanisms proposed for the same. Many factors may affect newborn weight loss such as parity of the mother, sore/cracked/flat nipple, breastfeeding adequacy. Our aim in this study is to assess significance of these factors in causing weight loss**. Material and methods**: The present study was a single-center, prospective observational study conducted on new born babies those are admitted with full term delivery and born with normal weight (>2500gm) in a tertiary center in urban bangalore. Neonates were weighed initially at birth by a digital weighing machine and then at regular intervals till day 3 and again on day 10 on follow up, the association of various factors of newborn weight loss were studied. **Result and Discussion:** In the current study 320 subjects were enrolled. 54.68% were LSCS deliveries and 43.43% were normal deliveries, 49.06% were with P2 parity. Among 320 patients, in 72.18% babies no significant weight loss was observed within 72 hours, 27.81% babies had five percent weight loss and 17.81% babies had ten percent weight loss. 158 mothers had feeling of emptying of breasts after feeding, among them 56 (35.44%) babies were found to have five percent weight loss and 32 (20.25%) babies had ten percent weight loss. 162 mothers did not have the feeling of emptying of breasts after feeding,among them 33 (20.37%) babies were having five percent weight loss and 25 (15.43%) babies had ten percent weight loss with P-value of 0.18 and 0.23, respectively. Among 175 mothers being shifted to post op ward, 73(41.7%)babies had 5 percent weight loss and 41(23.4%) babies had ten percent weight loss and among 145 mothers not shifted to

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post op ward only 19(13.10 %)had 5 percent weight loss and 18 (12.41%) babies had ten percent weight loss with significant p value of 0.0001. 89 Mothers had sore nipple/cracked/flat nipple, among them 32 (35.96%) babies had five percent weight loss and 20 (22.47%) babies had ten percent weight loss and among 231 Mothers not having sore nipple/cracked/flat nipple, 45 (19.48%) babies had five percent weight loss and 30 (12.99%) babies had ten percent weight loss with P-value of 0.003 and 0.001 respectively. 168 Mothers had inadequacy of breastfeeding, among them 69 (41.07%) babies had five percent weight loss and 39 (23.21%) babies had ten percent weight loss. among 152 Mother having adequacy of breastfeeding, 20 (13.16%) babies had five percent weight loss 18 (11.84%) babies had ten percent weight loss with p value of 0.0001. **Conclusion**: The p value was statistically significant for mothers shifted to post op wards, Mother having sore nipple/cracked/flat nipple and Inadequacy of breastfeeding and can be considered as risk factors for weight loss in babies.

Keywords: Birth Weight, Weight Loss, breastfeeding, Newborns

Introduction

Almost all newborns shed in their weight in the first days of their lives, and that is referred to as physiological weight reduction. They have an expanded extracellular compartment (ECF) compartment at birth due to various maternal, fetal, and placental factors. The weight loss is primarily due to the contraction of this expanded ECF compartment[1]. Excessive weight reduction is related to problems such as jaundice, hypoglycemia, and dehydration which also can cause renal failure, thrombosis, hypovolemic shock and seizures[2]. The volume of a newborn and the reduction in their weight during the first days of their birth is used as an indicator of breast feeding adequacy[3]. It is essential to decide the danger elements for immoderate weight reduction in order to discover some measures to prevent it. One of the known factor that may contribute for the weight reduction amongst the newborns is the caesarean section in mother and problems in mother associated with it. In one milestone study done by MacDonald *et al.*[4]., where they followed babies for 14 days, the newborn children were weighed every day while in clinic and intermittently after discharge. It was found after this examination, that weight reduction of up to 12% of birth weight is experienced by about 95% of children, and on a normal, babies began putting on weight by day 4 and recaptured their birthweight by day 9. Studies have additionally been done to search for any factor which may influence weight reduction in children separated from breastfeeding, with contrasting outcomes. These incorporate factors, for example, equality, method of conveyance, IV liquids directed during caesarean area, maternal sicknesses, perinatal intricacies, and natural factors[5]. Studies from Indian subcontinent regarding the matter are not many. In one such examination done by Bhat *et al.*[6] on only breastfed, term, sound infants, the weight reduction was huge in 6.8% of children (>10%), 24.7% of infants lost >5%, and in the rest of the babies weight reduction was not huge (<5%)[4.] Hence this study was taken up to determine the factors influencing weight loss in newborns.

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Materials and Methods

The present study was done in vydehi institute of medical sciences, bangalore,a prospective observational study conducted on new born babies those who were born at full term and with normal weight (>2500gm) in urban bangalore, from January 2018 to June 2020 after taking ethical committee clearance.

Inclusion criteria

- All consecutive full-term, singleton, live born babies more than 2500 grams and exclusively breast fed during the study period

Exclusion criteria

- Babies who receive top feeds, or receiving phototherapy, or had resuscitation at birth or later, babies who receive IV fluids or babies shifted to intensive care unit for any interventions, or sick due to any reason in the first 10 days were excluded

Data collection included details of various antenatal, natal and postnatal factors of the mother such as parity, mode of delivery, whether mother was shifted to post op wards, oral or intravenous fluids received by mothers before delivery, and adequacy of breast feeds by asking mothers regarding number of times the baby fed (on demand), feeling of emptying of breasts after feeding, baby slept well or not after feeds, and passed adequate urine, mother had sore/cracked/flat nipple and were recorded in a predesigned proforma.

Neonates were weighed initially at birth by a digital weighing machine (ESSAE BS-250 Digital Weighing Scale, Essae -Teraoka Pvt. Ltd,Bangalore, India) and then regularly at 12,24,48, intervals for 72 hours along with measurement of urine output. The weight on the 10^{th} day was recorded on the same scale by asking the patient to come back for follow up. Weight loss and the association of various factors of newborn weight loss were studied.

The collected data was entered into Microsoft Excel Worksheet-2010 and data was taken into IBM SPSS Statistic for windows, version 24(IBM Corp., Armonk, N.Y., USA) software for calculation of descriptive and inferential statistical analysis.

Results on continuous measurements were calculated as mean ± standard deviation (SD) and results on categorical measurements as number (%). Significance were assessed at 5% level of significance. Analysis of variance were used to find the significance of study parameters between three or more groups of patients, and Student's t-test (two tailed, independent) were used to find the significance of study parameters on continuous scale between two groups (intergroup analysis) on metric parameters

Results

During present study total 471 study subjects were reviewed in pediatric department, among them 320 (67.94%) patients were enrolled into the study according to present study's inclusion criteria and 151 (32.05%) patients were excluded according to exclusion criteria.

Table 1: Distribution of study population based on mother's age

Age Group (years)	No. of Population	Percentage	P-Value
≤20 years	**28**	**8.75**	
21-25	118	36.87	
26-30	95	29.68	**0.13**
31-35	65	20.31	

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≥35	14	4.37	
Total	**320**	**100**	

36.87% of mothers involved in the study were of 21-25 years age, 29.68% of mothers were 26-30 years of age.

Table 2: distribution according to mode of delivery

Mode of delivery	No. of Population	Percentage	P-Value
NVD	**139**	**43.43**	
LSCS	**175**	**54.68**	
Forceps	**4**	**1.25**	**0.001**
Assisted	**2**	**0.62**	
Total	**320**	**100**	

Among 320 patients, 175 (54.68%) were LSCS delivery followed by 139 (43.43%) were normal deliveries, 4 (1.25%) were forceps deliveries, and 2 (0.62%) were assisted delivery.

Table 3: Patients distribution according to Parity

Parity	No. of Population	Percentage	P-Value
Primi	**111**	**34.68**	
P2	**157**	**49.06**	
P3	**37**	**11.56**	**0.05**
P4	**15**	**4.68**	
Total	**320**	**100**	

Among 320 patients, 157 (49.06%) were P2 parity followed by 111 (34.68%) were primi parity, 37 (11.56%) were P3 parity, and 15 (4.68%) were P4 parity.

Table 4: Neonates were distributed according Birth weight (in grams)

Birth weight (in grams)	No. of Population	Mean ± Sd	P-Value
2500 - 2900	151 (47.19%)	2787.85 ± 144.55	
2901 - 3500	106 (33.13%)	3234.34 ± 144.32	0.001
>3500	63 (19.69%)	3713.97 ± 185.32	
Total	**320**		

In the current study the babies are categorized into three groups according to birth weight, 151 (47.19%) babies were found between 2500-2900 (grams), followed by 106 (33.13%) between 2901-3500 (grams) and 63 (19.69%) babies were more than 3500 grams

Table 5: weight of Babies at 72 hours (in grams)

Weight Loss (in grams)	No. of Population	Percentage	P-Value
No significant weight Loss	231	72.18	
Five percent loss	89	27.81	0.01
Ten percent loss	57	17.81	
Total	**320**	**100**	

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Among 320 subjects, in 231 (72.18%) babies weight loss was less than 5 % or no significant weight loss was observed within 72 hours, 89 (27.81%) babies had five percent weight loss and 57 (17.81%) babies had ten percent weight loss or more. However mean weight loss of all the babies under study was 5.04%. 295 babies had regained their birth weight by day 10 excluding 23 babies that couldn't be followed up on day 10.only 2 babies had not regained their birth weight.

Table 6: Gender of Baby* weight loss

weight loss/ Gender	**Male**	**Female**	**P-Value**
5% weight loss present	42 (25%)	47 (30.92%)	
5% weight loss absent	126 (75%)	105 (69.08%)	0.23
Total	168	152	
10% weight loss present	26 (15.48%)	31 (20.39%)	
10% weight loss absent	142 (84.52%)	121 (79.61%)	0.25

Out of 168 male babies, 42 (25%) babies were having five percent weight loss and 26 (15.48%) babies had ten percent weight loss.Among 152 female babies, 47 (30.92%) babies had five percent weight loss and 31 (20.39%) had ten percent weight loss. P-value is 0.23 and 0.25

Table 7: Feeling of emptying of breasts after feeding * weight loss

weight loss/ feeling of emptying of breasts after feeding	**Yes**	**No**	**P-Value**
5% weight loss present	56 (35.44%)	33 (20.37%)	0.18
5% weight loss absent	102 (64.55%)	129 (79.62%)	
Total	158	162	
10% weight loss present	32 (20.25%)	25 (15.43%)	0.23
10% weight loss absent	126 (79.74%)	137 (84.56%)	

158 mothers had feeling of emptying of breasts after feeding, among them 56 (35.44%) babies were found to have five percent weight loss and 32 (20.25%) babies had ten percent weight loss. 162 mothers did not have the feeling of emptying of breasts after feeding,among them 33 (20.37%) babies were having five percent weight loss and 25 (15.43%) babies had ten percent weight loss with P-value of 0.18 and 0.23

Table 8: Mother shifted to post op ward * weight loss

weight loss/ mother shifted to post op ward	**Yes**	**No**	**P-Value**
5% weight loss present	73 (41.71%)	19 (13.10%)	0.0001
5% weight loss absent	102 (58.29%)	133 (91.72%)	

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Total	175	145	
10% weight loss present	41 (23.42%)	18 (12.41%)	0.0001
10% weight loss absent	129 (76.79%)	134 (92.4%)	

Among 175 mothers being shifted to post op ward, 73(41.7%)babies had 5 percent weight loss and 41(23.4%) babies had ten percent weight loss and among 145 mothers not shifted to post op ward only 19(13.10 %)had 5 percent weight loss and 18 (12.41%) babies had ten percent weight loss with significant p value of 0.0001

Table 9: Mother having sore nipple/cracked/flat nipple * weight loss

Weight loss/ Mother having sore nipple/cracked/flat nipple	**Yes**	**No**	**P-Value**
5% weight loss present	32 (35.96%)	45 (19.48%)	0.003
5% weight loss absent	57 (64.04%)	186 (80.52%)	
Total	89	231	
10% weight loss present	20 (22.47%)	30(12.99%)	0.001
10% weight loss absent	69 (77.52%)	201 (87.01%)	

89 Mothers had sore nipple/cracked/flat nipple, among them 32 (35.96%) babies had five percent weight loss and 20 (22.47%) babies had ten percent weight loss and among 231 Mothers not having sore nipple/cracked/flat nipple, 45 (19.48%) babies had five percent weight loss and 30 (12.99%) babies had ten percent weight loss with P-value of 0.003 and 0.001 respectively.

Table 10: Adequacy of breastfeeding * weight loss

weight loss/ Adequacy of breastfeeding	**Inadequate**	**Adequate**	**P-Value**
5% weight loss present	69 (41.07%)	20 (13.16%)	0.0001
5% weight loss absent	99 (58.92%)	132 (86.84%)	
	168	152	
10% weight loss present	39 (23.21%)	18 (11.84%)	0.0001
10% weight loss absent	129 (76.78%)	134 (88.15%)	

168 Mothers had inadequacy of breastfeeding, among them 69 (41.07%) babies had five percent weight loss and 39 (23.21%) babies had ten percent weight loss. among 152 Mother having adequacy of breastfeeding, 20 (13.16%) babies had five percent weight loss 18 (11.84%) babies had ten percent weight loss with p value of 0.0001

Discussion

In the current study, more mothers are found in the age group of 21-25 years that is 36.87%, and 29.68% in the 26-30 age group. The means of age is 24.56± 3.62. Similar age patients were enrolled in previous studies like Joshi[7] *et al.*, Y.Miyoshi[8] *et al.* with mean age of 26.34 ± 2.71, 27.12 ± 3.42 respectively.

In present study among 320 patients, 54.68% were LSCS deliveries followed by 43.43% normal deliveries, 1.25% was forceps deliveries, and 0.62% was assisted delivery. But in

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previous studies like Joshi *et al.*, Y.Miyoshi *et al.* normal deliveries were more 68%, 64.6%,70% respectively.

In present study 49.06% were P2 parity followed by 34.68% were primi parity, 11.56% were P3 parity, and 4.68% were P4 parity. Similar observation in previous studies like Ravi J *et al.* and Badri K G [9]*et al.* studies, with primi parity of 40% and 37% respectively.

Among 320 patients, in 72.18% babies no weight loss observed within 72 hours, 27.81% babies had five percent weight loss and 17.81% babies had ten percent weight loss.

However mean weight loss of all the babies under study was 5.04% which can be considered as physiological weight loss. 295 babies had regained their birth weight by day 10 excluding 23 babies that couldn't be followed up on day 10. Only 2 babies had not regained their birth weight

In various studies including a systematic review done by Noel Weiss *et al.*, [10] it was found that median percentage of weight loss ranged from 3.2 to 8.3

Risk Factor to loss of weight after Birth

Gender of baby

In present study it was observed that gender of baby is not a risk factor to weight loss after birth. 52.5% were male and their mean weight was (2757.85 ± 132.55) and 47.5% were female and their mean weight was 2734.45 ± 140.32. Out of 168 male babies, 42 (25%) babies were having five percent weight loss and 26 (15.48%) babies had ten percent weight loss. Among 152 female babies, 47 (30.92%) babies had five percent weight loss and 31 (20.39%) had ten percent weight loss. P-value is 0.23 and 0.25, statistically not signficant

Hence gender of baby is not a risk factor for weight loss. In previous studies like miyoshi[6] *et al.* it was concluded that male gender is a risk factor

Feeling of emptying of breasts after feeding

158 mothers had feeling of emptying of breasts after feeding, among them 56 (35.44%) babies were found to have five percent weight loss and 32 (20.25%) babies had ten percent weight loss. 162 mothers did not have the feeling of emptying of breasts after feeding, among them 33 (20.37%) babies were having five percent weight loss and 25 (15.43%) babies had ten percent weight loss with P-value of 0.18 and 0.23, statistically not significant. Hence not having feeling of emptying of breast post feed is not a significant risk factor for weight loss

Mothers shifted to post op ward

Among babies of 175 mothers being shifted to post op ward, 73(41.7%)babies had 5 percent weight loss and 41(23.4%) babies had ten percent weight loss and among 145 mothers not shifted to post op ward only 19(13.10 %)had 5 percent weight loss and 18 (12.41%) babies had ten percent weight loss with significant p value of 0.0001.

Mothers being shifted to post op wards are ones who have undergone LSCS, mothers often have difficulty in positioning and feeding the babies post op, which can be considered significant factor influencing weight loss in babies.

Mother having sore nipple/cracked/flat nipple

89 Mothers had sore nipple/cracked/flat nipple, among them 32 (35.96%) babies had five percent weight loss and 20 (22.47%) babies had ten percent weight loss and among 231 Mothers not having sore nipple/cracked/flat nipple, 45 (19.48%) babies had five percent weight loss and 30 (12.99%) babies had ten percent weight loss with P-value of 0.003 and

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0.001 respectively. Hence Mother having sore nipple/cracked/flat nipple can be considered as risk factor for weight loss in newborns

Inadequacy of breastfeeding

168 Mothers had inadequacy of breastfeeding, among them 69 (41.07%) babies had five percent weight loss and 39 (23.21%) babies had ten percent weight loss. among 152 Mother having adequacy of breastfeeding, 20 (13.16%) babies had five percent weight loss 18 (11.84%) babies had ten percent weight loss with p value of 0.0001. hence inadequacy of breastfeeding is a risk factor for weight loss in neonates.

Conclusion

Mothers shifted to post op ward, Mother having sore nipple/cracked/flat nipple and Inadequacy of breastfeeding were risk factors for weight loss after full term delivery.

Gender of the baby, no feeling of emptying of breasts post feeding are not risk factors for weight loss in babies born at full term

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