

## Original Article

# Does weight loss on day one of life predict subsequent weight loss due to poor breastfeeding technique during the immediate newborn period? A hospital-based study in a tertiary care hospital in Sri Lanka.

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### Abstract

**Background:** Weight measurement is used to assess breastfeeding adequacy. Initial weight loss within the first few days occurs due to the insensible water loss and loss of fluid by voiding during where oral intake of milk is still low. Excessive weight loss indicates insufficient milk transfer.

**Objective:** To determine if weight loss  $\geq 5\%$  on day one predicted an eventual weight loss  $\geq 10\%$  and if weight loss of  $\geq 5\%$  was associated with poor breastfeeding technique.

**Methodology:** A prospective longitudinal study was conducted at the University Unit, De Soysa Hospital for Women, Colombo, Sri Lanka on all live births more than 34-weeks-gestation from 15/01/2014–15/04/2014. Babies with congenital abnormalities and those that required admission to the neonatal unit were excluded. Weight was measured daily using the same scale (SECA 334) until discharge. All mothers were counselled and were provided hands on, one-to-one practical support regarding breastfeeding. All babies were reviewed within 2-3 days of discharge with clinic follow up until reaching birth weight. The weight nadir

was taken as the lowest weight recorded before achieving the birth weight.

**Results:** We had a study population of 377 exclusively breastfed babies where 51% were boys. Mean gestational age was  $38 \pm 2.2$  weeks whereas mean birth weight was  $2.91 \pm 0.45$  kg (1.380–4.965 kg) where 16.7% were low birth weight ( $< 2.5$  kg). Breastfeeding technique was satisfactory in 49% with poor attachment in 42%, poor positioning in 1% and both poor positioning and attachment in 8%. The mean weight loss on day one was  $3.5 \pm 2.6\%$  where most babies (79.4%) had a weight loss of less than 5%. The mean weight loss was  $6.7 \pm 3.7\%$  by day 2 of age. Babies who lost  $\geq 5\%$  of weight on day one were more likely to lose  $\geq 5\%$  of weight on day 2 ( $p < 0.001$ ) and have a weight nadir of  $\geq 10\%$  ( $p < 0.001$ ). Weight nadir occurred at an average age of 3.3 days. Babies with  $\geq 5\%$  weight loss were more likely to be preterm ( $p = 0.004$ ), be born via caesarean section ( $p = 0.007$ ), have a poor breastfeeding technique ( $p = 0.003$ ) and get readmitted for feeding support ( $p < 0.001$ ).

**Conclusion:** Weight loss  $\geq 5\%$  on day one predicts subsequent weight loss associated with poor breastfeeding technique.

## Introduction

Breastfeeding is the gold standard for infant nutrition, growth and development<sup>1</sup>. Weight measurement is one of the most frequently used tools to assess breastfeeding adequacy<sup>2</sup>. The first few days after birth are characterized by an initial weight loss<sup>3</sup>. This physiological weight loss mainly results from in sensible water loss and loss of fluid by voiding during a period of time when their oral intake of milk is still low<sup>4</sup>. Weight loss was noted be higher in babies born via caesarean section where mothers had received intravenous fluid prior to delivery<sup>2</sup>. A systematic review on physiological weight loss of the breastfed neonate noted the paucity of longitudinal studies and reported a mean weight loss of 5.7% to 6.6%, with maximum weight loss on the second or third day after birth where the majority regained their birth weight within the first 2 weeks after birth<sup>2</sup>. A weight loss of between 7 and 10% of birthweight was often detected in neonates with delayed establishment of breastfeeding<sup>4,5</sup>.

An Italian study done on 1760 term exclusively breastfed infants born via vaginal delivery reported an average weight loss of 5.95% with the nadir occurring at 43.7 hours where none of the infants lost more than 10% of their birth weight<sup>6</sup>. Excessive weight loss or inadequate weight gain indicated insufficient milk transfer<sup>7</sup>. A study done on by Flaherman et al found that weight loss of  $\geq 5\%$  in day 1 predicted an eventual weight loss  $\geq 10\%$ <sup>8</sup>.

Positioning (how the infant is held in relation to the mother's body) and attachment (how the infant is attached to the breast) are essential components of the breastfeeding technique<sup>9</sup>. Provision of skilled support for breastfeeding has been shown to increase the rate of exclusive breastfeeding within the first 6 months of life<sup>10</sup>. Although initiation of breastfeeding

within the first hour was reported in 90.3%, exclusive breastfeeding was found in only 63.8% at 4-5 months of age according to the latest demographic health survey 2016/2017 in Sri Lanka<sup>11</sup>. Almost all (99%) deliveries occur in health care facilities in Sri Lanka<sup>12</sup>. Ensuring that mothers are equipped with the skills to breastfeed as well as that the baby is receiving adequate breastmilk prior to discharge are essential steps in increasing the rate of exclusive breastfeeding. This study was undertaken to study if weight loss before discharge is a reliable method to ensure that breastfeeding is established prior to discharge.

## Objectives

We aimed to assess if weight loss  $\geq 5\%$  on day one predicted an eventual weight loss  $\geq 10\%$  and if weight loss of  $\geq 5\%$  was associated with poor breastfeeding technique.

## Methods

We conducted a prospective longitudinal study on all live births more than 34-weeks-gestation born from 15/01/2014 – 15/04/2014 at the University Unit, De Soysa Hospital for Women, Colombo, Sri Lanka. All babies born after 34-weeks-gestation and lived until discharge, whose parents agreed to attend clinic visits until the birth weight was achieved and gave informed written consent were included in the study. Babies with congenital abnormalities and those that required admission to the neonatal unit were excluded.

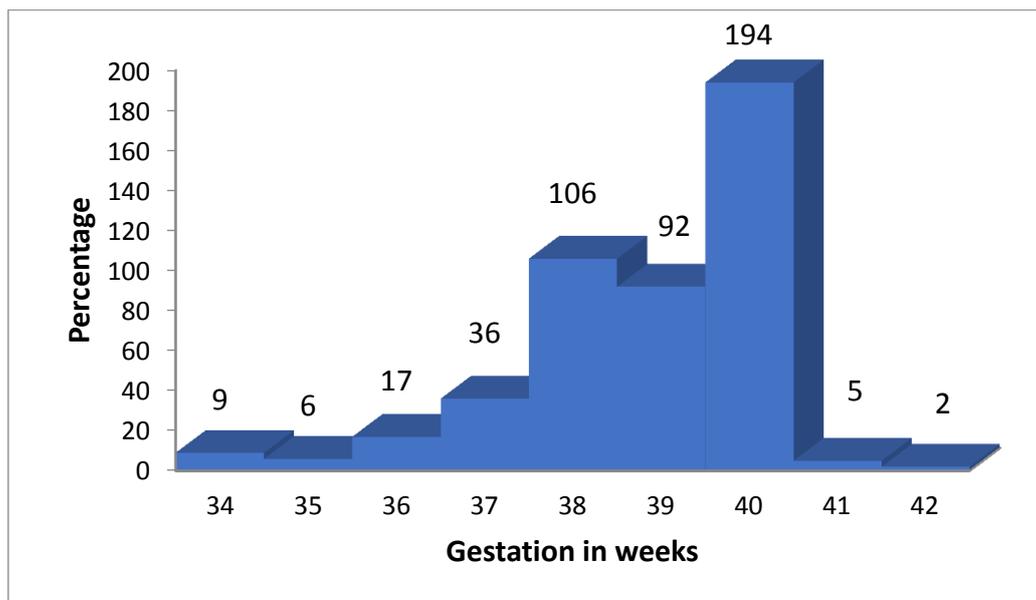
The naked weight was measured using a SECA 334 electronic weighing scale, accurate to the nearest 10g and calibrated twice weekly. Birth weight was checked soon after birth whereas day 1 weight

measurement was made within 12–24 hours of birth. Weight was measured daily using the same scale until discharge. All mothers were counselled and hands on, one-to-one practical support regarding breastfeeding was given by the health care staff consisting of doctors, nurses and midwives. Babies who were clinically well and whose breastfeeding technique was satisfactory were eligible for discharge. All babies were reviewed within 2-3 days of discharge and clinic reviews were continued until the babies achieved their birth weight. The weight nadir was taken as the lowest weight recorded before achieving the birth weight. Permission to carry out this study was obtained from the head of the institution. Data was collected with a pre-

tested data recording form. Data was analysed using SPSS (v16) and Pearson Chi square test was used for comparison between groups.

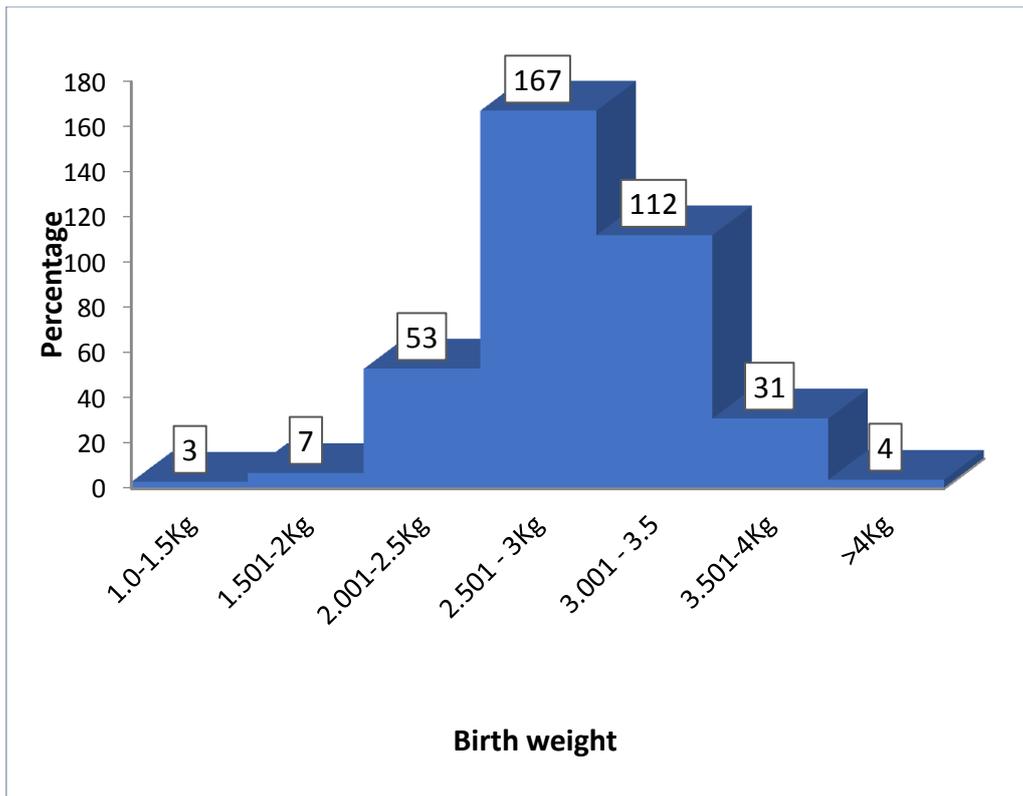
## Results

We recruited 416 live births  $\geq$  34-weeks-gestation, out of which 26 required admission to the neonatal unit, 03 died and 10 did not attend clinic, resulting in a study population of 377 babies. Our study population consisted of 193 boys (51%) and 184 girls (49%). All babies were exclusively breastfed. The distribution of gestation and birth weight are given in Figures 1 and 2.



**Figure 1: Distribution of gestation in our study population**

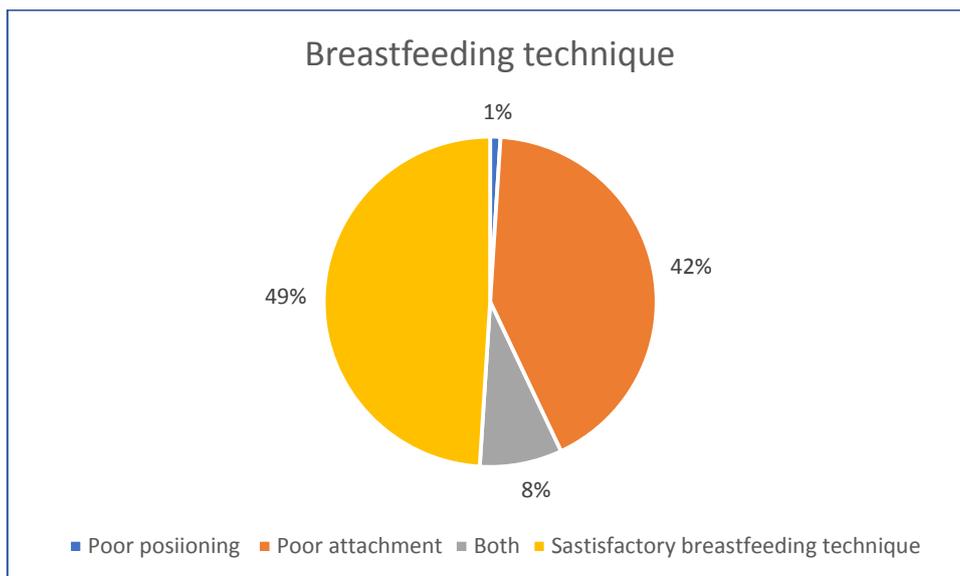
Our study population had a mean gestational age of  $38 \pm 2.2$  weeks. Most babies ( $n=344$ , 93.9%) were born at term gestation (37 weeks and more) where only 23 babies (6.1%) were born preterm with less than 37 weeks gestation.



**Figure 2: Distribution of birth weight in our study population**

Our study population had a mean birth weight of  $2.91 \pm 0.45$  kg ranging between 1.380–4.965 kg. There were 63 (16.7%)

babies who were low birth weight (<2.5kg). The breastfeeding technique of the study population is depicted in Figure 3.



**Figure 3: Distribution of breastfeeding technique in our study population**

Only about half (49%) of the study population had satisfactory breastfeeding technique whereas almost another half (42%) had poor attachment with 8% with both poor positioning and attachment and 1% with poor positioning alone.

The mean weight loss was 3.5% ± 2.6 % on day one where most babies (n=299, 79.4%)

had a weight loss of less than 5% whereas 20.6% (n=78) babies had a weight loss of 5% or more. Discharge after completion of 24 hours occurred in 157 babies, while 220 (58.3%) babies had a weight measurement on day 2. The mean weight loss was 6.7%±3.7% by day 2 of age. The association between weight loss on day 1 and day 2 is given in Table 1.

**Table 1: Relationship between weight loss on day one and day two**

	Day 1 <5% wt loss	Day 1 ≥5% wt loss	Pearson Chi square
Day 2 <5% wt loss	72/172 (42%)	3/48 (6%)	
Day 2 ≥5% wt loss	100/172 (58%)	45/48 (94%)	p<0.001
<b>Total</b>	<b>172</b>	<b>48</b>	

Babies who lost ≥5% of weight on day one were more likely to lose ≥5% of weight on day 2 as well (p<0.001). Poor breastfeeding technique was significantly associated with

weight loss ≥5% on day 2 (p=0.003). The relationship between weight loss on day 1 and a weight nadir of 10% or more is given in table 2.

**Table 2: Relationship between weight loss on day one and a weight nadir of 10% or more**

	Day 1 <5% wt loss	Day 1 ≥5% wt loss	Pearson Chi square
<10% weight nadir	292 (97.7%)	60 (79.3%)	
≥10% weight nadir	7 (2.3%)	18 (21.7%)	p<0.001
<b>Total</b>	<b>299</b>	<b>78</b>	

Babies who lost more that ≥5% on day one of life were more likely to have a weight nadir of ≥10% (p<0.001) as shown in table 2. The average age when the weight nadir

occurred was 3.3 days of age. The relationship between weight loss on day one and readmission (prior to achieving birth weight) is given in table 3.

**Table 3: Relationship between weight loss on day one and readmission**

Readmission	Day 1		Pearson Chi square
	<5% wt loss	≥5% wt loss	
No	297 (99.4%)	54(69.2%)	
Yes	2 (0.6%)	24 (30.8%)	p<0.001
<b>Total</b>	<b>299</b>	<b>78</b>	

Babies who lost more than  $\geq 5\%$  on day one of life were more likely to get readmitted for feeding support ( $p < 0.001$ ) as shown in table 3.

There was no significant difference in the distribution of ethnicity, gender or birth

weight between the  $< 5\%$  and  $\geq 5\%$  weight loss groups. The relationship between the period of gestation and the mode of delivery with weight loss on day 1 is shown in table 7-8.

**Table 4: Period of gestation vs weight loss on day one**

Gestation (weeks)	Weight loss <5%		Weight loss ≥5%		Pearson Chi square
	No.	%	No.	%	
<b>34 – 36+6</b>	20	7.1	13	16.6	
≥ 37	279	92.9	65	83.4	p=0.004
<b>Total</b>	<b>299</b>	<b>100</b>	<b>78</b>	<b>100</b>	

**Table 5: Mode of delivery vs weight loss on day one**

Mode of delivery	Weight loss <5%		Weight loss ≥5%		Pearson Chi square
	No	%	No	%	
Normal vaginal delivery	213	71.2	44	56.4	
Elective C Section	47	15.7	17	21.8	
Instrumental delivery	34	11.4	12	15.4	p=0.007
Emergency C Section	5	1.7	5	6.4	
<b>Total</b>	<b>299</b>	<b>100</b>	<b>78</b>	<b>100</b>	

Preterm babies ( $p=0.004$ ) as well as babies born via caesarean section ( $p=0.007$ ) were more likely to have  $\geq 5\%$  weight loss as shown in tables 4 and 5.

## Discussion

The mean weight loss on day one in our study population was  $3.5\% \pm 2.6\%$  which was lower than the  $5.7\% - 6.6\%$  reported in the systematic review by Weiss et al<sup>2</sup>. This may be because all babies in our study population were exclusively breastfed compared to varied feeding methods included in the systematic review. The mean weight loss of  $3.5\% \pm 2.6\%$  in our study population was lower than that reported by Bertini et al ( $5.95\%$ ) whose population was also exclusively breastfed<sup>6</sup>. The average age of the weight nadir which was 3.3 days in our study population was in agreement with the results of the systematic review but was later than the 43.7 hours reported by Bertini et al<sup>2,6</sup>.

Weight loss  $\geq 5\%$  on day one was seen in 20.6% of the study population and was seen to have a significant association with weight loss on day 2, weight nadir of  $\geq 10\%$  and with readmission. Weight loss  $\geq 5\%$  on day 2 was significantly associated with poor breastfeeding technique. Weight loss  $\geq 5\%$  on day one was significantly higher in preterm babies as well as babies delivered via caesarean section whereas no significant difference was seen regarding ethnicity, gender, or birth weight. Our findings were similar to that of Flaherman et al who also found that first day weight loss of  $\geq 5\%$  predicts subsequent weight loss of  $\geq 10\%$  and that babies delivered via caesarean section are more prone to early weight loss<sup>8</sup>.

## Conclusion and recommendations

Weight loss  $\geq 5\%$  on day one predicts subsequent weight loss associated with poor breastfeeding technique. This indicates that the percentage of weight loss of  $\geq 5\%$  in addition to breastfeeding technique can be used to identify mother baby pairs who need more support for breast feeding. We suggest to ensure that babies born via caesarean section as well as late preterm babies get extra support for breastfeeding as they are more likely to encounter higher amounts of weight loss. We also suggest that all babies' weights are checked daily and percentage loss calculated so that discharge is considered only for those with a good breastfeeding technique and weight loss  $< 5\%$ . Mother baby pairs with  $\geq 5\%$  weight loss or having a poor breastfeeding technique should be given extra breastfeeding support where discharge can be considered once breastfeeding technique is satisfactory and with decreasing weight loss or commencement of weight gain.

## References

1. UNICEF. Infant and Young Child Feeding. Programming Guide. 2011.
2. Noel-Weiss J, Courant G, Woodend AK. Physiological weight loss in the breastfed neonate: a systematic review. *Open Med.* 2008;2(4):e99-e110.
3. Regnault N, Botton J, Blanc L, Hankard R, Forhan A, Goua V, Thiebaugeorges O, Kaminski M, Heude B, Charles MA; EDEN mother-child cohort study group. Determinants of neonatal weight loss in term-infants: specific association with pre-pregnancy maternal body mass index and infant feeding mode. *Arch Dis Child Fetal Neonatal Ed.* 2011 May;96(3):F217-22.

4. Rautava S. Neonatal weight loss and exclusive breastfeeding. *Acta Paediatrica* 2015; 104 (10): 965-966
5. Academy of Breastfeeding Medicine Protocol Committee. *Breastfeed Med.* 2009; 4(3):175-82.
6. Bertini G, Breschi R, Dani C. Physiological weight loss chart helps identify high-risk infants who need breastfeeding support. *Acta Paediatr* 2015; 104: 1024– 27.
7. Lawrence RM, Lawrence RA. 2022. Normal Growth, Growth Faltering, and Obesity in Breastfed Infants. In Lawrence RM, Lawrence RA. *Breastfeeding (Ninth Edition)*, 298-325, Elsevier.
8. Flaherman JF et al. First day weight loss predicts eventual weight nadir for breastfeeding newborns.. *Arch Dis Child Fetal Neonatal Ed* 2013;98: F4888-F492.
9. Tiruye, G., Mesfin, F., Geda, B. et al. Breastfeeding technique and associated factors among breastfeeding mothers in Harar city, Eastern Ethiopia. *Int Breastfeed J* 2018; 13 5.
10. Prasitwattanaseree P, Sinsuksai N, Prasopkittikun T, Viwatwongkasem C. Effectiveness of Breastfeeding Skills Training and Support Program among First Time Mothers: A Randomized Control Trial. *Pacific Rim Int J Nurs Res* 2019; 23(3) 258-270
11. Department of Census and Statistics (DCS) and Ministry of Health, Nutrition and Indigenous Medicine. *Nutrition of children and women. Sri Lanka Demographic and Health Survey 2016 Sri Lanka.* 2017; 157-174.
12. Family Health Bureau, National emergency obstetric and neonatal care needs assessment, country report 2012. Sri Lanka: Ministry of Health; 2014.

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