

Poor birth weight recovery among preterm infants following hospital discharge in NICU, tertiary care hospital

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Abstract

Background: Healthy infants typically regain their birth weight by 21-30 days of age; however, failure to do so may be due to medical, nutritional, or environmental factors. Globally, low birth weight deliveries are high, but few studies have assessed the postnatal weight changes in this category of infants, especially in Africa. The aim was to determine what proportion of LBW infants had not regained their birth weight by 21-30 days of age after discharge from the Special Care of the Tertiary Care Hospital, Dhaka, Bangladesh. **Aim of the study:** The aim was to determine what proportion of LBW infants had not regained their birth weight by 21-30 days of age after discharge from the Special attending the NICU Tertiary Care Hospital, Dhaka, Bangladesh. **Methods:** A cross-sectional study was conducted assessing the weight recovery of 118 LBW infants attending the NICU Tertiary Care Hospital, Dhaka, Bangladesh from January 2020 to December 2020. Infants aged 21-30 days with a documented birth weight and whose mothers gave consent to participate were included in the study. Baseline information was collected on demographic characteristics, history of pregnancy, delivery, and postnatal outcome through interviews and follow up. Pertinent infant information like gestation age, diagnosis, and management was obtained from the medical records and summarized in the case report follow-up script. **Result:** The result is described in two groups; 1st is regained BW (62) and 2nd is not regained BW (56). Logistic regression for factors associated with failure to regain birth weight is described in table-4; the time of initiation of the first feed was COR* (1.87), 95% CI (1.05-3.35), AOR* (1.91), 95%CI (1.07-3.4) and the p-value (0.034), the gavage feeding was COR* (1.9), 95% CI (1.06-3.42), AOR* (1.2), 95% CI (0.65-2.2) and the p-value (0.561) and the number of days of hospital stay was COR* (4.11), 95% CI (2.27-7.44), AOR* (4.17), 95% CI (2.30-7.755) and the p-value (0.001). **Conclusion:** Currently, the burden of morbidity in this group of high-risk infants is undetected and unaddressed in many developing countries. Measures for consideration to improve the care of these infants would include; discharge after regaining birth weight and use of total parenteral nutrition. However, due to the pressure of space, keeping the baby and mother is not feasible at the moment hence the need for a strong community system to boost the care of the infant. Close networking with support groups within the child's environment could help alleviate this problem.

Keywords: Weight recovery, Preterm infants.

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INTRODUCTION

Over the past 40 years, although under-five and infant mortality declined in developing countries, neonatal mortality rates remain static. Approximately 3.9 of the 10.8 million annual deaths in under-fives are neonatal, mostly in rural areas, with 50-70% during the first week of life.^{1,2} Like any other part of the developing world, in Bangladesh also there has been a substantial reduction in under-five and infant mortality. Under-five mortality has been reduced from 248 per 1000 live births in 1960 to 69 per 1000 live births in 2005, and infant mortality from 149 per

1000 live births in 1960 to 46 per 1000 live births in 2005.³ Major declines in infant mortality, however, have occurred in the post-neonatal period, i.e., within the first 28 days of life.⁴ In Bangladesh neonatal mortality accounts for about two-thirds of infant deaths and about half of the deaths among children aged under 5 years. The Bangladesh Demographic and Health Surveys (BDHS) indicate that the neonatal mortality rate (the number of deaths of children under 28 days of age, per 1,000 live births) declined in the early 1990s, but remained at 1000 live birth between 1995-1999 and 1999-2003.⁵⁻⁷ Growth assessment in the neonatal period is determined by changes in anthropometric measurements and consistent weight gain is a valuable guide indicating adequate growth.⁸ The change in weight during the neonatal period of LBW infants is characterized by an initial loss of approximately 8-15% of the birth weight in the first 7-14 days following delivery and thereafter recovery occurs within 21-30 days.^{9, 10} Postnatal weight loss in the early neonatal period is greater in very LBW (weigh 1000gm-1500gm) and extreme LBW (weigh less than 1000gm) infants, although considerable variation occurs among individual infants. Growth delay or failure to regain birth weight may occur due to prevailing postnatal care practices and/or various factors, which may be medically, nutritionally or environmentally related.¹⁰ Reducing neonatal mortality in Bangladesh will be necessary for the achievement of the targets for child mortality reduction under the United Nations Millennium Development Goals.¹¹ The direct causes of neonatal deaths in high mortality countries are preterm births (27%), sepsis (26%), perinatal asphyxia (23%), tetanus (7%), and diarrhea. (3%).¹² Very low birth weight (VLBW) is defined as a birth weight of fewer than 1500 grams and is an important determinant of neonatal morbidity and mortality.^{13, 14} Its prevalence is directly correlated with the developmental state of a country and it is associated with poverty. Bangladesh is a developing country and an estimated 20% of babies are born prematurely and 30% have low birth weight (LBW).¹⁵ To sustain gains in child survival and achieve Millennium Development Goals, extra efforts should be given to reduce the neonatal deaths which are 10-15 fold higher than the risk during the post-neonatal period of infancy (2-12 months) and approximately 30-fold greater than during young childhood (13-60 months). Despite constituting a small portion of LBW newborns, VLBW infants demand high technology health care delivery and consume a great number of resources. Although outcomes of VLBW infants have been reported extensively from industrialized countries, less is known about the outcome of such infants in the developing world.¹⁶⁻¹⁹ The aim was to determine what proportion of LBW infants had not regained their

birth weight by 21-30 days of age after discharge from the NICU in a Tertiary Care Hospital, Dhaka, Bangladesh.

METHODOLOGY AND MATERIALS

It is a Cross-sectional type of descriptive study from January 2020 to December 2020, carried out at the Department of Paediatrics and NICU in the Tertiary Care Hospital, Dhaka, Bangladesh. 118 Preterm low birth weight babies were admitted to NICU and the subjects were selected consecutively from the study population. Preterm newborns (<37weeks of gestation), weighing < 2500gm and < 72 hours old of both sex and whose parent or guardian provided informed consent were eligible for enrolment and babies in moribund condition and major congenital anomaly were excluded. Data was collected using a structured questionnaire (Research Instrument) containing all the variables of interest. The questionnaire was finalized following pretesting. Collected data was checked daily and edited (if needed). A detailed history of the illness was taken from the patient, thorough general and systemic examination and findings of the performed investigations, relevant associated medical conditions and outcome were recorded carefully. The data was compiled and analyzed in a tabulated form. Data was collected by direct observation, follow up and also from the records of follow up of the baby kept in NICU, during the hospital stay period.

RESULT

This is a Cross-sectional study, a total of 118 patients were included and analyzed in this study. The result is described in two groups; 1st is regained BW (62) and 2nd is not regained BW (56). Table-1 shows the characteristics of the study participants at 21-30 days. The male was 61(51.69%) patients and the female was 57(48.31%) patients in this study. The gestation age is also described in table-1; 44(37.29%) patients were from \leq 32 weeks and 74(62.71%) patients were from >32 weeks. Table-1 also shows the number of pregnancies, weight at birth, initiation of the first feed, mode of feeding exclusive breastfeeding, gavage feeding and duration of hospital stay. The socio-demographic characteristics of infants and their mothers are represented in table-2; from the maternal age, 24(38.71%) patients were from the age range 21-25 in the 1st group and 20(35.71%) patients were from the age range \leq 20 of 2nd group. From the mode of delivery, Normal Vaginal Delivery (NVD) is shown in the same number of patients for both two groups (Table-2). Table-3 shows the factors associated with failure to regain birth weight and it's defined as like as same table-1. Logistic regression for factors associated with failure to regain birth weight is described in table-4; the time of initiation of the first feed was COR* (1.87), 95% (CI) (1.05-3.35), AOR* (1.91),

95% CI (1.07-3.4) and the p-value (0.034), the gavage feeding was COR* (1.9), 95% CI (1.06-3.42), AOR* (1.2), 95% CI (0.65-2.2) and the p-value (0.561) and the number

of days of hospital stay was COR* (4.11), 95% CI (2.27-7.44), AOR* (4.17), 95% CI (2.30-7.755) and the p-value (0.001).

Table 1: Characteristics of study participants at 30 days

Variable	All infants (N = 118)	%	Regained BW (N = 62)	%	Did not regain BW (N = 56)	%
Sex						
Male	61	51.69	34	54.84	26	46.43
Female	57	48.31	28	45.16	30	53.57
Gestation age (weeks)						
≤ 32	44	37.29	20	32.26	24	42.86
> 32	74	62.71	42	67.74	32	57.14
Weight at birth						
≤ 1500 g	44	37.29	20	32.26	24	42.86
> 1500g	74	62.71	42	67.74	32	57.14
Initiation of the first feed						
> 48 hours	45	38.14	17	27.42	28	50.00
≤ 48 hours	73	61.86	45	72.58	28	50.00
Mode of feeding						
Exclusive breastfeeding						
Yes	110	93.22	59	95.16	51	91.07
No	8	6.78	3	4.84	5	8.93
Gavage feeding						
Yes	77	65.25	26	41.94	15	26.79
No	41	34.75	36	58.06	41	73.21
Duration of hospital stay						
≤ 7 days	75	63.56	50	80.65	26	46.43
> 7 days	43	36.44	12	19.35	30	53.57

Table 2: Socio-demographic characteristics of infants and their mothers

Variable	Regained BW (N = 62)	%	Did not regain BW (N = 56)	%
Maternal Age				
≤ 20	21	33.87	20	35.71
21-25	24	38.71	18	32.14
26-29	12	19.35	12	21.43
≥ 30	5	8.06	6	10.71
Mode of delivery				
NVD	51	82.26	51	91.07
C/S	11	17.74	5	8.93
Marital status				
Married	34	54.84	42	75.00
Single	25	40.32	14	25.00
Education level				
None/primary	38	61.29	36	64.29
Secondary +	24	38.71	20	35.71
Mother's occupation				
None	8	12.90	6	10.71
Housewife	27	43.55	23	41.07
Other	27	43.55	27	48.21
ANC Attendance**				
Yes	56	90.32	48	85.71
No	6	9.68	8	14.29
Illness in pregnancy				
Yes	27	43.55	23	41.07
No	35	56.45	33	58.93

Father's education				
None	18	29.03	10	17.86
Primary	6	9.68	4	7.14
Secondary	27	43.55	28	50.00
Graduate	11	17.74	14	25.00

Table 3: Factors associated with failure to regain birth weight.

Variable	Frequency	Percentage	COR	95% CI	p-value
Gestation age (in weeks)					
> 32	24	42.86	1.63	0.92-2.90	0.08
≤ 32	32	57.14	1.00		
Number of pregnancy					
Single	39	69.64	1.44	0.78-2.67	0.242
Multiple	17	30.36	1.00		
Initiation of the first feed					
≤ 48 hours	21	37.5	2.54	1.43-4.53	0.001*
>48 hours	35	62.5	1.00		
Mode of feeding					
Exclusive breastfeeding					
Yes	51	91.07	1.88	0.59-6.49	0.302
No	5	8.929	1.00		
Gavage feeding					
Yes	41	73.21	1.90	1.06-3.42	0.028*
No	15	26.79	1.00		
Duration of hospital stay					
≤ 7 days	26	46.43	4.76	2.57-8.95	0.001*
> 7 days	30	53.57	1.00		

Table 4: Logistic regression for factors associated with failure to regain birth weight

Variable	COR*	95% CI	AOR*	95% CI	p-value
Time of initiation of the first feed	1.87	1.05-3.35	1.91	1.07-3.4	0.034
Gavage feeding	1.9	1.06-3.42	1.2	0.65-2.2	0.561
Number of days of hospital stay	4.11	2.27-7.44	4.17	2.30-7.55	0.001

COR* - Crude Odds Ratio, AOR* - Adjusted Odds Ratio, CI - Confidence Interval

DISCUSSION

The current study, reflective of a predominantly low-income urban maternal and neonatal population in Dhaka, Bangladesh provides important insights into neonatal risk factors contributing to post-discharge growth failure in LBW infants. Almost half of the LBW infants seen in the NICU had not regained their birth weight by 21-30 days of age. This is surprising since LBW infants should typically regain their birth weight within 21-30 days of age.²⁰ Due to the limited resources and institutional restrictions, one may speculate that infants in the study would have received more personalized care promoting improved growth while at home; however, this does appear to be the case. A large number of LBW infants in the NICU poses constraints on the available resources, which in turn may under optimal care encouraging good growth. The limited resources endorse early discharge of infants from the NICU with follow-up. The potential success of this system is contingent on adherence to the scheduled appointments. Lack of follow-up precludes to failure to identify neonatal complications promptly, which may have consequences on

the infant's wellbeing, both short and long-term. It appears that early discharge was detrimental to proper postnatal growth in many of the study participants. Although a more prolonged hospital stay offers an appealing, albeit costly, alternative for supporting proper weight gain and neonatal care in low-income countries, this option is not currently feasible in settings similar to this study. The factors that significantly contributed to the failure to regain birth weight among the LBW infants were, hospital stay of more than 7 days and initiation of first feed of more than 48 hours. Feeding in the first one hour of life (WHO recommendation) could not be possible in many the LBW infants for other institutional setups, like the initial separation of the mother and baby, may contribute to the delay. Although there have been documented cost-effective interventions in neonatal care, few of them reached desired weight among preterm infants in low-income countries.^{21, 22} Further research is needed to assess care practices given to the infants while at home to better understand any factors that may be contributing to poor weight gain. The need for simple interventions that can be

implemented while discharge is particularly great since keeping infants hospitalized until they attain weights of 2000gm-2500gm is not possible due to lack of space. Simple interventions to improve infant care in the community may include women support groups, family members, and the village health teams to encourage infant feeding, skin-to-skin care, and community healthcare worker assessments to identify and treat neonatal sepsis. This has been demonstrated to be feasible in some low-resource settings in Asia and has been proved successful.²² Although it was not one of our study objectives, we found that 39% (25/64) had lost their siblings by 30 days of age among the multiple infants. This is a high prevalence and concurs with other findings of risks, morbidity, and mortality associated with preterm multiple births.²³ Special attention should be given to these high-risk infants regarding discharge planning, parental, counseling, and follow-up evaluations to help prevent adverse outcomes. Future studies are needed to determine the etiology of this increased mortality in LBW multiple infants discharged from the NICU. We had no control over the timing of discharge and scheduling of follow-up dates. Ideally, all infants would have been seen at 21-30 days of age; however, this could not be done due partly to logistic reasons, the post-discharge state of the infant, and the caretaker's decision on when to return to the clinic. Many infants were excluded due to post-dates and this could have affected our results.

Limitations of the study

The study was conducted in a single hospital with small sample size. So, the results may not represent the whole community. Since all recorded information was obtained from the mother and the available medical records, recall bias and incomplete documentation respectively may have affected our results. Additionally, maternal nutritional status and health were not assessed, which may have impacted the growth of the infants in the study.

CONCLUSION AND RECOMMENDATIONS

Failure to regain birth weight among low-birth-weight infants by 21-30 days of age is a common problem occurring in almost half of the neonates attending the NICU. Currently, the burden of morbidity in this group of high-risk infants is undetected and unaddressed in many developing countries. Measures for consideration to improve the care of these infants would include; discharge after regaining birth weight and proper feeding and nutritional management. However, due to the pressure for lack of space, keeping the baby and mother is not feasible at the moment hence a strong community system to boost the care of the indeed. Close networking with support groups within the child's environment could help improve

growth. There is a need for the evaluation of simple, cost-effective interventions in the community settings before the discharge of the LBW infants.

Ethical approval: The study was approved by the Institutional Ethics Committee.

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