Original Article

Morbidity status of low birth weight babies in rural areas of Assam: A prospective longitudinal study

Madhur Borah[1], Rupali Baruah[2]

[1]Department of Community Medicine, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Meghalaya, [2]Department of Communty Medicine, Gauhati Medical College, Guwahati, Assam, India

Abstract

Introduction: Low birth weight (LBW) infants suffer more episodes of common childhood diseases and the spells of illness are more prolonged and serious. Longitudinal studies are useful to observe the health and disease pattern of LBW babies over time. **Aims:** This study was carried out in rural areas of Assam to assess the morbidity pattern of LBW babies during their first 6 months of life and to compare them with normal birth weight (NBW) counterparts. **Materials and Methods:** Total 30 LBW babies (0-2 months) and equal numbers of NBW babies from three subcenters under Boko Primary Health Centre of Assam were followed up in monthly intervals till 6 months of age in a prospective fashion. **Results:** More than two thirds of LBW babies (77%) were suffering from moderate or severe under-nutrition during the follow up. Acute respiratory tract infection (ARI) was the predominant morbidity suffered by LBW infants. The other illnesses suffered by the LBW infants during the follow up were diarrhea, skin disorders, fever and ear disorders. LBW infants had more episodes of hospitalization (65%) than the NBW infants (35%). Incidence rate of episodes of morbidity was found to be higher among those LBW infants who remained underweight at 6 months of age (Incidence rate of 49.3 per 100 infant months) and those who were not exclusively breast fed till 6 months of age (Incidence rate of 66.7 per 100 infant months). **Conclusion:** The study revealed that during the follow up, incidence of morbidities were higher among the LBW babies compared to NBW babies. It was also observed that ARI was the predominant morbidity in the LBW infants during first 6 months of age.

Keywords: Breast feeding, diarrhea, hospitalization, infant, longitudinal study, low birth weight, malnutrition, morbidity, rural population

Introduction

Low birth weight (LBW) is one of the most important predictors of the health and survival of the infant. LBW and preterm babies are particularly vulnerable to illness and death during their initial years of life. LBW infants suffer more episodes of common childhood diseases like diarrhea, respiratory infections and the spell of illness is more prolonged and serious and often leads to hospital admission compared to normal birth weight (NBW) infants.[1,2] In 2013, nearly 22 million newborns–an estimated 16 per cent of all babies born globally that year–had LBW. The problem of LBW babies is more serious in India and other South East Asian countries. It was estimated that 28% of all newborns in this region were LBW babies.[3] National Family Health Survey 3 in India estimated that out of all the newborns who were weighted at birth 22% of them were LBW.[4] High percentage of LBW babies among the newborns is reflected on the heath of neonates and infants in India with high mortality and morbidity in these age groups and LBW being one of the main causes of neonatal and infant deaths in India.[5] Longitudinal studies are useful to observe the health and disease pattern of LBW babies over time. These types of studies reveal the velocity of growth, duration of illnesses, mortality etc., of LBW babies in comparison to NBW babies. In rural India, incidence of LBW babies are more (23.3%) than the urban areas (19.3%).[4] These babies grow with many added disadvantages which hamper their growth and development in the most crucial years of life. But there are few longitudinal studies involving rural LBW infants in our country especially in this region.

Therefore, this longitudinal study was carried out in rural areas of Assam to assess the morbidity pattern of LBW babies during their first 6 months of life and to compare them with NBW counterparts.

Material and Methods

The study was undertaken in Boko-Bongaon Development Block, Kamrup District of Assam. It was a rural block situated

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Address for correspondence: Dr. Madhur Borah, Department of Community Medicine, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Meghalaya - 793 018, India.
E-mail: borahmadhur8@gmail.com

about 85 km west of Guwahati city and connected by National Highway No-37. For our study we purposively selected 30 LBW babies (0-2 months) and equal numbers of NBW babies of the same age group (Total 60 infants) over three subcenter areas under Boko PHC. First, we randomly selected three subcenters under Boko Block PHC. Then from each subcenter we selected 10 numbers of LBW babies and equal numbers of NBW babies from subcenter registers who fulfilled our inclusion criteria. Then they were tracked to their homes with the help of local community level health workers and their parents were interviewed. The infants were followed up in monthly intervals till 6 months of age. During the follow up, the infants were clinically examined, anthropometric measurements were taken and predesigned pretested questionnaires were used to obtained information from the parents. Schedule was pretested in three village of the same block with 25 infants. These infants were not part of the study subjects. Any available medical records like doctor's prescription, hospital discharge certificate, laboratory investigation reports were also examined for data collection. Study period was from January 2013 to August 2013.

Inclusion criteria: All singleton infants, whose parents were permanent residents of the study area and gave informed consent to be part of the study and who were available for the follow up for 6 months.

Exclusion criteria: Multiple births, infants not available for follow up for 6 months, those infants whose birth weight was not known, infants with major congenital malformations, severe birth asphyxia and chromosomal anomalies were excluded from the study.

Considering the level of significance at 5% and power of the study 80% we have calculated the sample size taking the earlier prevalence $P_1 = 87\%$ and $P_2 = 51\%$ among the two groups.[6]

Pooled prevalence = $P_1 + P_2/2 = 69\%$

$$\text{Sample Size } N = \frac{2(1.96 + 0.8)^2 \; 0.69(1 - 0.69)}{(0.87 - 0.51)^2} \; [7]$$

Calculated sample size was found to be 27 in each group. Considering 10% nonrespondents and loss to follow up we decided to take 30 infants in each follow-up group.

Important definition we used for morbidity status of the infants where there was no available medical records: Acute diarrhea: Infant was considered to be suffering from diarrhea if she/he passed liquid or watery stool more than three times a day or in case of young infants if the stools had changed from usual pattern and were many and watery (more watery than fecal matter) or a recent change in consistency or frequency of stool. Fever: Mother giving history of high temperature of the infants. Fever within 48 hours of taking immunization was not considered. Acute respiratory tract infection (ARI): An infant was considered to be suffering from ARI when she/he had running nose, cough with or without fever, fast breathing, and difficulty in breathing with or without chest in drawing during the recall period. Ear infection: History of discharge from ear and swelling or redness in and around the ear was taken as ear infection. Skin infection: An infant was considered to be suffering from skin disease if she/he had localized skin eruption (papule, pustule), itching, umbilical redness and draining pus. Eye infection: An infant was considered to be suffering from eye infection if mother gave history of reddening of eye, watering or discharge.

Ethical clearance was obtained from Medical College ethics committee and written informed consent was taken from each participant. The data were entered in MS Excel 2007 software and statistical analysis was done in SPSS 17.0 software.

Results

Among the 30 LBW infants, there were 17 males (56.7%) and 13 females (43.3%). Majority of the LBW babies belonged to the joint family (66.7%). Among the mothers, 20% were illiterate and 60% of the mothers were Hindu by religion. The study revealed that out of the 30 mothers 8 were primipara (26.7%) and teenage mothers. Out of 30 women, 2 (6.7%) were unregistered for antenatal care during the pregnancy and 23% of the women had less than 4 ANC during pregnancy. But no significant statistical association could be found between age of the mother, education and parity of mother, numbers of ANC visits, and type of family with the birth weight of baby.

The morbidity pattern was described in numbers of episodes of illnesses. ARI, diarrhea, Skin infection, fever and ear infection were the common morbidities among the infants. Table 1a shows that incidence of ARI was highest among all the morbidities in both NBW (8 episodes) and LBW infants (12 episodes) during first 2 months of age. On comparison the incidence of all the morbidities were found to be higher among the LBW infants (61.2%) than the NBW infants (38.8%).

During 3rd and 4th months of age, episodes of morbidities were higher among the LBW infants (62.5%) than the NBW infants (37.5%). ARI remained the morbidity with highest incidences (24 episodes) in both NBW and LBW infants [Table 1b]. During 5th and 6th months of age, more episodes of morbidities occurred in the LBW group (54.5%) than the NBW group (45.5%). ARI was the predominant

Table 1a: Study subjects according to morbidity pattern at 2 months of age

Morbidity types	Numbers of episodes (%)		Total (%)
	LBW infants	NBW infants	
ARI	12 (60)	8 (40)	20(100)
Diarrhea	4 (57.2)	3 (42.8)	7 (100)
Ear infection	4 (100)	0 (0)	4 (100)
Skin infection	7 (53.8)	6 (46.2)	13(100)
Fever	3 (60)	2 (40)	5 (100)
Total	30 (61.2)	19 (38.8)	49(100)

LBW: Low birth weight; NBW: Normal birth weight

morbidity (18 episodes) in this age group followed by diarrhea (8 episodes) and skin infection [Table 1c].

During the follow-up period of 6 months it was seen that LBW infants had more episodes of hospitalization (65%) than the NBW infants (35%). Out of the 30 LBW infants, 26 were exclusively breast fed up to 6 months of age. Among them incidence rate of morbidity was found to be 43.5 per 100 infant months. While four LBW infants were not exclusively breast fed till 6 months of age and among them incidence of morbidity was found to be highest (incidence rate of 66.7 per 100 infant months). Among the NBW infants 23 were exclusively breast fed till 6 months of age while 7 infants were not. Those infants who were of NBW at birth and were exclusively breast fed till 6 months of age had fewer incidences of morbidities (incidence rate of 42.8 per 100 infant months).

At 6 months of age, 77.4% of LBW infants were found to be underweight, while 22% of NBW infants were also underweight at 6 months of age [Table 2]. On calculating relative risk (RR) for under nutrition it was found that LBW babies were at 3.74 times greater risk of under nutrition in first 6 months of age compared to NBW counterparts.

Incidence rate of episodes of morbidity was found to be highest among those LBW infants who remained underweight (< –2SD) during the follow-up period (incidence rate of 49.3 per 100 infant months). Among the NBW infants, incidence rate was high among the underweight infants (incidence rate of 42.8 per 100 infant months). While the lowest incidence rate of morbidity was among the NBW infants who were of normal weight at 6 months of age [Table 3].

Discussion

The present study revealed that during the follow up, the incidence of morbidities were higher among the LBW babies compared to NBW babies. The illnesses suffered by the infants during the follow-up period were ARI, diarrhea, skin disorders, fever and ear disorders. Similar studies in India have found that diarrhea, ARI, fever of short duration, and sore eyes were the common illnesses in infancy.[8,9]

The present study observed that ARI was the predominant morbidity in the LBW infants during first 6 months of their age. Sharma *et al.* also found that prevalence of ARI was higher among LBW babies and showed a strong association, as compared to NBW babies.[10] Similarly, Jackson *et al.* observed that LBW was a significant risk factor for ARI.[11]

Our study also found that LBW infants had more episodes of morbidities compared to NBW infants. Similarly, McItire *et al.* observed that there were increased morbidity episodes in infants who were term and birth weight below 3rd percentile for their gestational age.[12] Chaudhuri *et al.*[13] and Barros *et al.*[14] too found that preterm and LBW babies presented with increased morbidity during infancy.

The present study found that during the follow-up period up to 6 months of age, LBW infants had more episodes (65%) of hospitalization than the NBW infants. Paul *et al.* also in their follow-up community-based study in an urban slum of Kolkata found that hospitalization rates were more in LBW infants than in NBW infants during first year of life.[15]

The incidence rate of episodes of morbidities was found to be highest among LBW infants who were not exclusively breast

Table 1b: Study subjects according to morbidity pattern at 4 months of age

Morbidity types	Numbers of episodes (%)		Total (%)
	LBW infants	NBW infants	
ARI	15 (62.5)	9 (37.5)	24 (100)
Diarrhea	4 (57.2)	3 (42.8)	7(100)
Skin infections	6 (60)	4 (40)	10(100)
Fever	3 (75)	1 (25)	4 (100)
Ear infections	2 (66.7)	1 (33.3)	3 (100)
Total	30 (62.5)	18 (37.5)	48 (100)

LBW: Low birth weight; NBW: Normal birth weight

Table 1c: Study subjects according to morbidity pattern at 6 months of age

Morbidity types	Numbers of episodes (%)		Total (%)
	LBW infants	NBW infants	
ARI	11 (61.2)	7 (38.8)	18 (100)
Diarrhea	5 (62.5)	3 (37.5)	8 (100)
Skin infection	4 (57.2)	3 (42.8)	7 (100)
Fever	2 (28.6)	5 (71.4)	7(100)
Ear infection	2 (50)	2 (50)	4 (100)
Total	24 (54.5)	20 (45.5)	44 (100)

LBW: Low birth weight; NBW: Normal birth weight

Table 2: Distribution of LBW and NBW infants according to their nutritional status at 6 months of age

	LBW	NBW	Total
Underweight	24(77.4)	7 (22.6)	31(100)
Normal	6(20.6)	23 (79.4)	29(100)
Total	30	30	60

RR=3.74, 95 % CI=1.78 to 7.82. LBW: Low birth weight; NBW: Normal birth weight

Table 3: Morbidity episodes among LBW and NBW infants and their nutritional status

Nutritional status	(LBW infants)			(NBW infants)		
	No of infants	Episodes of morbidity	Incidence rate	No of infants	Episodes of morbidity	Incidence rate
Under weight	24	71	49.3	7	18	42.8
Normal	6	13	36.1	23	39	28.3

(Unit for Incidence rate is per 100 infant months). LBW: Low birth weight; NBW: Normal birth weight

fed up to 6 months of age. Among the exclusively breast fed infants the incidence rate was higher among LBW infants than the exclusively breast fed NBW infants. A similar study in South India showed that breast feeding protects against overall morbidity and acute respiratory illness among children who were exclusively breast fed for 6 months.[16] Tallo *et al.* also found that LBW infants who were exclusively breast fed till 4 months of age had lower risk of morbidities than those who were not exclusively breast fed.[17] Oddy *et al.* and Lamberti *et al.* also had similar findings in their studies.[18,19]

The study also found that during first 6 months of age most of the LBW babies remained underweight and incidence rate of episodes of morbidity was highest among those LBW infants who remained underweight at 6 months of age. Motta *et al.* also found that LBW was an important risk factor of nutritional risk at the end of the first year of life.[20]

Limitation of the study

Our study used purposive sampling instead of random sampling and there might be some selection bias. Frequency of the follow up was another limitation; we followed up the infants in monthly intervals instead of biweekly follow up due to lack of resources.

Conclusion

Out study findings indicated the vulnerability of LBW babies during the infancy to various infections, morbidities and malnutrition. Though the study had many limitations the study findings like increased incidence of morbidity, malnutrition and increased hospital admission among the rural LBW infants compared to NBW infants point to the need of special care to those vulnerable infants. Health education to parents, regular follow up of LBW infants through trained health workers and training of grass root level health workers on care of LBW babies are some measures which should be implemented.

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