Original Research Article

A community based cross sectional study of prevalence and risk factors of low birth weight

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Abstract

Introduction: Birth weight is an independent and an important factor that affects mortality, morbidity and growth and development during infancy and later life. India is accounting for 40% of the global Burdon of low birth weight babies. Multiple causative factors identified to be responsible for low birth weight. **Aims & objectives:** 1. To estimate the prevalence of low birth weight babies. 2. To study the association of maternal factors with birth weight. **Method:**The present community based cross sectional study conducted to among the urban population of Rajkot city and identify the determinants of low birth weight. Sampling population was selected by multistage sampling method. Investigator collected history of low birth weight and other determinants by verification of records and examination by house to house visit. **Result:**The prevalence of low birth was found 19.6. The factors like sex of the baby, birth order, birth spacing, maternal age, maternal education, regular antenatal check-up and mother's weight gain during pregnancy were found significant determinants of LBW. **Conclusion:**The prevalence of low birth was high in urban area require multipronged strategy. The primary health care can diminish the determinant of the low birth weight by adequate birth interval, two-child norms, regular antenatal check-up, supplementary nutrition to mother, female literacy etc.

Keywords: Low Birth Weight, Maternal factor, Prevalence, Malnutrition.

Introduction

World Health Organization defines low birth weight (LBW) as the birth weight less than 2500 grams irrespective of gestational age[1]. World health organisation estimate that each year around 25 million babies born with low birth weight globally, among these 95% are from developing countries. Lack of adequate maternal and child health services in such countries augment the problem. Southern Asia is the region with the highest incidence of low birth weight followed by Africa, Latin America and eastern Asia[2,3].

Every 7th child born is low birth weight globally, and every third Asian newborn is low birth weight. India, the second most populous country of the world; accounts for more than 40% of the global burden of low birth weight babies[3,4] As per the NFHS data, the prevalence of low birth weight in India was 18.2% and in Gujarat, it was 19.0%[5].

Birth weight is the most important determinant of perinatal survival, infant morbidity, and infant mortality. It also determines the nutritional status and growth and development in later life[2,3]. Low birth weight is the single most important determinant of the survival chance of the child. Unfortunately, many of them not survive up to their first birthday. The lower the birth weight, the lower is the survival chance. More than 80% of neonatal deaths are among LBW newborns, of which two-thirds are preterm and one third are term small-for-gestational-age. Infant mortality is 20 times and child mortality is 5-30 times higher among the low birth weight babies compared to its normal counterparts[6,8]. LBW is also an important marker of adverse health and development problems in early and later life, including delays in cognitive and behavioural development, growth retardation, neurological problems in childhood, and many chronic diseases[8].

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Malnutrition in its three categories, stunting, wasting and underweight is higher among the low birth weight babies compared to normal weight babies. The cycle of malnutrition started during the foetal period lead to malnutrition in childhood, adolescence and adult phase if not intervened. The maternal malnutrition is the important contributory factor for low birth weight. So, the malnutrition cycle never ends. Popularly say that "Malnutrition is found to start in the womb and ends in the tomb"[9,10].

Low birth weight, episodes of diarrhoea and the presence of developmental delay are often associated with malnutrition in most developing nations including India[11].

The problem of LBW is multifaceted. It includes socio-demographic characteristics, nutritional status of the mother, antenatal care, multiple pregnancies, obstetric complications, chronic maternal conditions and exposure to environmental factors, such as indoor air pollution, and tobacco and drug use etc[4,6].

LBW also reflects inadequate nutrition and ill-health of the mother. There is a strong and significant positive correlation between maternal nutritional status and the length of pregnancy and birth weight. A high percentage of LBW, therefore, points to the nutrition deficient health status of pregnant women, inadequate prenatal care and the need for improved care of the newborn[7].

To achieve the reduction of the prevalence of low birth weight babies to 30% in time of 2025 require evidence-based multifactorial intervention and national commitment[4].

The present study was undertaken to find out the prevalence of low birth weight babies and its association with socio-cultural and maternal risk factors in this area so that it will help to improve health policies and programmes to address this important health problem.

Material and Methods

The present community-based cross-sectional study was conducted among the infant population of the urban area of Rajkot city. The study has been conducted over a period of four months in the year 2018. A Child less than 1 year of age (Infant) was the sampling unit. All infants whose parent was willing to participate in the study were included and those who were suffering from a terminal illness,

endocrinal disorder and metabolic disorder were excluded from the study.

The sample size was calculated through open Epi software using single population proportion formula $n = (Z_{\alpha/2^2}) * p(1-p)/d^2$ based on the following assumption: 95% confidence interval, 5% margin of error, 18% as anticipated prevalence (NFHS 2015-16) and 10% non response rate. $n = \frac{(1.96)^2 \times 18 \times 82}{(5)^2} = 227$, into that if we adjoin 5% as non-response than the final calculated sample size was 240 infants.

We selected the sample population by the multistage sampling method. In the first stage of sampling, we selected 30 Anganwadi by cluster sampling method. In the second stage, we selected 8 infants registered under each selected Anganwadi by random sampling method (lottery method). Investigator was visited each selected infant's house for data collection. The purpose of the study and methods of data collection was introduced to the parents of the infants (study population), informed consent was obtained from the parents who are ready to participate in the study voluntarily. Data was collected in a pre-tested and pre-validated structured questionnaire. Information on a socio-demographic variable, feeding practices and obstetrics history was collected by direct interview. Information on birth weight, vaccination, and obstetric profile collected from medical records, and at the end, anthropometric measurement was carried out. Confidentiality was maintained through anonymity in the use of the questionnaire.

Operational definition

Low birth weight baby: Any infant with a birth weight of less than 2500 grams irrespective of their period of gestation.

Term baby: Babies born from 37 completed weeks to less than 42 completed weeks of gestation.

Pre-term baby: Babies born before the end of 37 weeks of gestation.

Post-term Baby: Babies born at 42 completed week or any time thereafter of gestation.

Result

Total 240 infants were included in the study in which 118 infants (49.2%) were females while 122 infants (50.8%) were males. (Table 1) Out of the total 240 enrolled infants, 143 (59.6%) were in the 1 to 6 months of age groups, 84 (35%) were in the 6 to 12 months of age group and 13 (5.4%) were less than one month of age.(Table 1)

Table 1: Age and sex wise distribution of study participants. (n=240)

Age-sex distribution		Frequency	Percentage
Age (Month)	< 1	13	5.4
	1 to 6	143	59.6
	6 to 12	84	35.0
Sex	Female	118	49.2
	Male	122	50.8

The prevalence of low birth weight was 19.6%. Total 47 study participant was low birth weighted. The prevalence of LBW was more among males (27%) compared to females (11.8%) and the difference is statistically significant (p=0.003).At the time of visit, 134 (55.8%) infants were malnourished while the rest 106 (44.2%) infants were normal as per the IAP classification for malnutrition. Total 47 infants were low birth weight; out of them, 70.2% were malnourish at the time of visit. While 193 infants were normal birth weight; out of them, 52.3% were malnourish at the time of visit. Severe malnutrition (grade 4) was also much common among low birth weight infants (36.2%) compared to normal birth weight infants (6.2%). (Fig. 1)

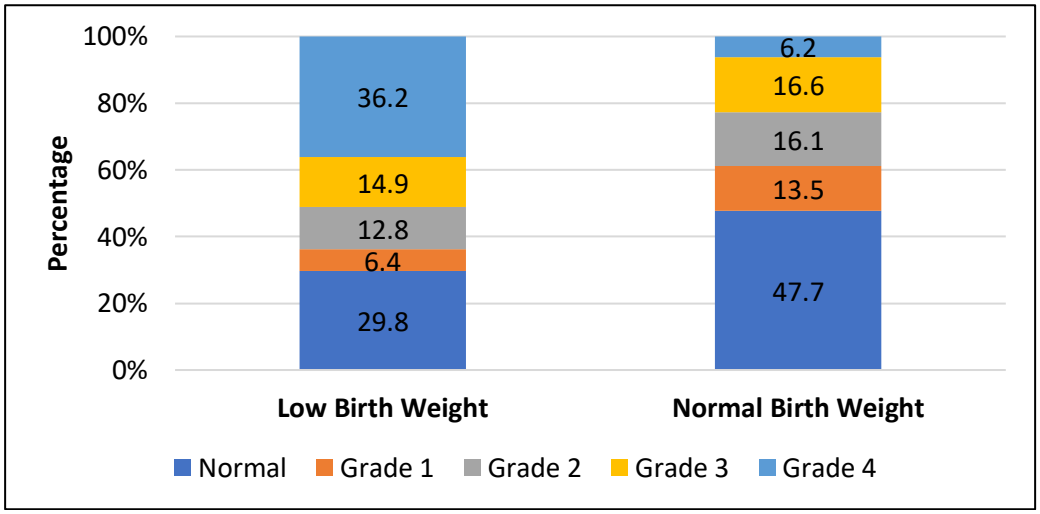

Fig. 1: Association of birth weight and malnutrition during infancy

The proportion of LBW was maximum among third and higher than third birth (42.8%) followed by second birth (20%) and then in first birth (12.8%); this depicts that risk of LBW is increase with each subsequent birth. The difference of LBW according to birth order is statistically significant (p=0.0001).

Birth interval and Low birth weight is positively associated. The proportion of LBW was highest among the babies, who born with less than 1 year of birth interval (100%) followed by the birth interval between 1 to 3 years (28.5%) and least among those who born after a birth interval of 3 years or more (23.9%). The difference is statistically significant (0.0152).

LBW was found more among the babies born to mothers whose age is either less than 20 years or more than 30 years. Half of the babies born with low birth weight to mothers whose age is below 20 years of age during childbirth. While 27.3% babies born with low birth weight to mother having an age of 30 years or more during childbirth. The difference is statistically non-significant (p=0.065).The proportion of LBW was higher among the mothers who were illiterate (36.8%)

compared to the literate mothers (16.3%). The association between a mother's education and birth weight is statistically significant (p=0.009).

The proportion of LBW was higher among the babies of mothers who had less than four ANC visits (33.4%) compared with babies of a mother who had four or more ANC visits (18.8%) during pregnancy. The difference is statistically non-significant (p=0.3907).Prevalence of LBW was found 14.1% among those babies born from mothers who gain adequate weight during pregnancy (≥ 10 kg) compared to 22.6% among those mothers who gain <10 kg weight during pregnancy. A low prevalence of LBW was found among the babies who born after a gestational period of 37 weeks called "full-term babies" (16.1%) while prevalence was as high as 52.2% among the babies who born before the completion of 37 weeks of the gestational period "preterm babies". This association is statistically significant (p=0.0001).

Table 2: Association of birth weight with different variables

Parameters	Birth Weight		Total (n=240)	P-value (Chi-square)
	Low (n=47)	Normal (n=193)		
Sex				
Female	14 (11.9%)	104 (88.1%)	118 (100%)	0.003
Male	33 (27%)	89 (73%)	122 (100%)	
Birth order				
1	16 (12.8%)	109 (87.2%)	125 (100%)	0.0001
2	16 (20%)	64 (80%)	80 (100%)	
≥3	15 (42.8%)	20 (57.2%)	35 (100%)	
Birth spacing				
<1	3 (100%)	0 (0%)	3 (100%)	0.0152
1 To 3	12 (28.5%)	30 (71.5%)	42 (100%)	
≥ 3	17 (23.9%)	54 (76.1%)	71 (100%)	
NA	15 (12%)	109 (87.9%)	124 (100%)	
Age of mother				
< 20	2 (50%)	2 (50%)	4 (100%)	0.065
20 - 30	30 (16.6%)	151 (83.4%)	181 (100%)	
≥ 30	15 (27.3%)	40 (72.7%)	55 (100%)	
Education of mother				
Illiterate	14 (36.8%)	24 (63.2%)	38 (100%)	0.009
Literate	33 (16.3%)	169 (83.7%)	202 (100%)	
ANC visit				
<4	4 (33.4%)	8 (66.6%)	12 (100%)	0.3907
≥4	43 (18.8%)	185 (81.2%)	228 (100%)	
Weight Gain				
< 10 kg	35 (22.6%)	120 (77.4%)	155 (100%)	0.1585
≥ 10 kg	12 (14.1%)	73 (85.9%)	85 (100%)	
Term				
Full Term	35 (16.1%)	182 (83.9%)	217 (100%)	0.0001
Preterm	12 (52.2%)	11 (47.8%)	23 (100%)	

Discussion

In the present study, the prevalence of low birth weight was found to be 19.6%. National family health survey-4 shows similar results. According to NFHS-4, the prevalence of low birth weight was 19.0% and 18.2% in Gujarat state and India respectively. The prevalence of low birth weight was decreasing continuously due to improved service delivery in maternal and child health areas. It was around 40% in 2011[5,12]. A higher prevalence of LBW was found in males (27%) compared to females (11.8%). Similar findings were seen in Agarwal, et al. in their study[12]. The risk of low birth is increase in each subsequent birth. Different findings were seen in a study conducted by Agarwal, et al, a higher proportion of low birth was seen in first birth order[12].

As revealed by the present study, the proportion of LBW was higher among the mother with a narrow birth interval of fewer than 3 years. With the continuation of breastfeeding if mother became pregnant increase the demand for energy and nutrient and if, it is not meet from the diet then lead to poor maternal nutritional status. That subsequently lead to low birth weight baby. Hence, it is recommended to adopt birth spacing methods and widen the birth interval at least up to 3 years. Young mothers (age less than 20 years) or older mothers (age more than 30 years) having a higher chance of low birth weight baby. The findings of the present study were comparable with the findings of Raman et al. and Negi et al., who observed a similar relationship between the age of the mother and birth weight. It shows the probability of LBW increases in two extremes of ages, i.e., below 20 years of age and more than 30 years of age in mothers[13,14].

This study also revealed that low maternal education is related to LBW. The prevalence of LBW was inversely related to the maternal education status. Joshi et al. also published similar findings in their study[15]. Those mothers who received regular and frequent antenatal visits (> 4 ANC) compared to those who received < 4 ANC visits having less chance of LBW baby. Joshi et al. and Idris et al. also published similar findings in their study where the incidence of LBW was 57% and 61.76% in mothers who did not receive any antenatal care respectively. Association between irregular antenatal checkups and LBW may be due to noncompliance with advice/drugs during the antenatal period[15,16]. This study also revealed that low maternal weight gain during pregnancy was related to a high prevalence of LBW. Chhabra et al. have observed similar results in their study, hence it is recommended to improve the nutritional status of women throughout pregnancy will reduce the problem of LBW[17]. More than 70% of low birth weight babies were in the state of malnutrition

during infancy while compared with normal-weight babies it was around 50%. A severe form of malnutrition also found much higher among infants born with low birth weight compared to those infants born with normal weight were having mild to moderate malnutrition. This difference increases the risk of mortality, morbidity and delayed development. Also in the study of peter et al malnutrition was found much higher among low birth weight compared to normal weight[9]. The present study revealed that the Prevalence of LBW higher among preterm babies compared to term babies, which is comparable to the findings of the study by Agarwal, et al[12] This is consistent with national and international findings indicating that maternal variables and risk behaviours during pregnancy play important roles on LBW.

Conclusion

The problem of low birth weight was significantly high. Poor pregnancy outcome like LBW is the result of a multiplicity of factors and cannot be corrected by a narrow pharmaceutical shortcut. The factors like sex of baby, birth order, birth spacing, maternal age, maternal education, regular antenatal check-up and mother's weight gain during pregnancy were significant determinants of LBW. To reduce infant mortality, child mortality and malnutrition targeted intervention required to reduce the problem of low birth weight. The primary health care system should strengthen to target the determinant of the low birth weight by adequate birth interval, two-child norms, regular antenatal check-up, supplementary nutrition to mother, female literacy etc.

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