

# Study on the factors associated with low birth weight among newborns delivered in a tertiary-care hospital, Shimoga, Karnataka

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## Abstract

**Background:** About 27% of babies born in India are of low birth weight (LBW). Most of the LBW babies die during their first year of life. The infant mortality rate is about 20 times greater for all LBW babies compared with the normal weight babies.

**Objective:** To determine the proportion of LBW babies delivered in the study setting and to assess the various factors associated with LBW.

**Materials and Methods:** A hospital-based cross-sectional study was conducted at a tertiary-care hospital in Shimoga for a period of 2 months. The study population comprised the postnatal mothers and their newborn babies in McGann Hospital and Teaching Center, Shimoga, Karnataka. A pretested questionnaire was used for the collection of data on the factors associated with LBW.

**Result:** Of the 131 mothers, 41 (31.3%) of them delivered LBW babies. The significant determinants associated with the mothers who delivered LBW babies were as follows: age of the mother <20 years (57.1%), literacy rate (illiterate 56.3%), weight gain during pregnancy <6.5 kg (92.9%), day time rest during pregnancy <2 h (66.7%), birth interval <2 years (73.3%), and hemoglobin level of the mother at the time of delivery <11 g/dL (64.9%).

**Conclusion:** Thus, this study concluded that the problem of LBW is multidimensional. Hence, we need integrated and comprehensive approaches, which institute a combination of interventions to improve the overall health of the women.

**KEY WORDS:** Anemia in pregnancy, birth interval, low birth weight, rest during pregnancy

## Introduction

Children's health is tomorrow's wealth or healthy child is the wealth of our nation is one of the WHO slogans. We will get a healthy child when the mother is healthy; health of the child is closely related to mother's health.

Low birth weight (LBW) is one of the major problems in the developing world, including India. The WHO defines LBW as birth weight less than 2,500 g irrespective of the gestational age.<sup>[1]</sup> There is a significant variation in the incidence of LBW across the regions. The WHO estimates that, globally, incidence of LBW is 15.5%, which means that about 20.6 million such infants are born each year, 96.5% of them in developing countries.<sup>[1]</sup> The level of LBW in developing countries (16.5%) is more than double the level in developed regions (7%).<sup>[2]</sup> India is one of the countries with the highest incidence of LBW. About 27% of babies born in India are of LBW, and mortality rate among them is very high during the first year of life.<sup>[3]</sup> The infant mortality rate is about 20 times greater for all LBW babies than for other babies.<sup>[2]</sup> South Asia has the highest incidence, with 28% of all infants with LBW,

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while East Asia/Pacific has the lowest, at 6%. Nearly 40% of all LBW babies in the developing world are born in India<sup>[4]</sup>.

The birth weight of an infant is the most important determinant of its chances of survival, healthy growth, and development and is dependent on many maternal factors. A healthy mother delivers a healthy baby, and a malnourished mother contributes to LBW baby. Therefore, this study was planned to find out the epidemiological factors associated with LBW among institutional deliveries so that suitable recommendations can be made to prevent LBW

## Materials and Methods

This cross-sectional study was carried out at a tertiary-care hospital, Shimoga Institute of Medical Sciences (SIMS), in Shimoga, Karnataka. The study population were the postnatal mothers and their newborn babies in McGann Hospital and teaching Center, Shimoga. Institutional ethical clearance was obtained. The sample size was calculated with an expected frequency of 27%, allowable error at 10%, and confidence level at 99%. The sample size was found to be 131. The unit of study was where all mothers delivered live babies in the study place. Still birth, newborns with congenital malformation, mothers with systemic diseases, and mothers who did not give an informed consent were excluded from the study.

A pretested questionnaire was prepared by the investigator before undertaking the study. It was pretested by carrying out a pilot study with a sample of 30 subjects. These 30 subjects were included in the study subsequently. All babies were weighed within 24 h after the birth. A birth weight of <2,500 g was considered as LBW.

### Statistical Analysis

The responses were coded and the data tabulated on Microsoft Excel sheet, and analysis was done by using Epi-Info-7 version software. The  $\chi^2$ -test was used to analyze the association between the LBW and various factors. Multivariate logistic regression analysis was done to calculate the adjusted odds ratio with 95% CI.

## Result

This study was carried out among 131 postnatal mothers and their newborns in a tertiary-care hospital, SIMS, Shimoga, Karnataka. Of the 131 newborn babies, 57 (43.5%) were boys and 74 (56.5%) girls. Of the 131 mothers, 89 (67.9%) of them were in <20 years age group and 42 (32.1%) of them were  $\geq 20$  years age group. Of the 131 mothers, 12.2% of the subjects were illiterate, 38.2% were working women, and the maximum number of mothers belonged to socioeconomic status class IV (46.57%) and class V (33.59%), according to modified BG Prasad classification.

In this study, the proportion of LBW was 31.3% [Figure 1]. Mother's age, education, occupation, day time rest during pregnancy, weight gain during pregnancy, hemoglobin level

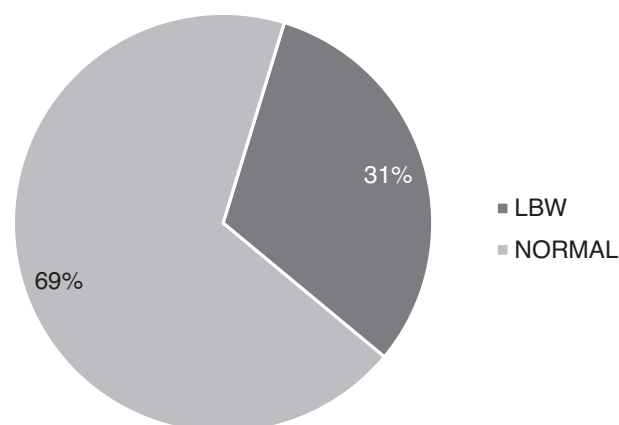


Figure 1: Proportion of low birth weight.

at the time of delivery, and history of tobacco chewing showed a statistically significant association with LBW ( $p < 0.001$ ) [Table 1].

Multivariate logistic regression analysis of the significant factors reports that maternal weight gain <6.5 kg during pregnancy, day time rest <2 h during pregnancy, hemoglobin level <11 g/dL at the time of delivery, and age of the mother <20 years were significantly associated with LBW [Table 2].

Religion, parity, birth order, and sex of the baby did not show any statistically significant relation with LBW ( $p > 0.05$ ).

## Discussion

This study was carried out among 131 mothers and their newborns in a tertiary-care hospital, SIMS, Shimoga, Karnataka, to assess the various factors associated with LBW.

The proportion of LBW in this study was 31.3%. Many hospital-based studies<sup>[5-7]</sup> showed that the LBW prevalence rate to be more than 30%. The reason might be that most of the high-risk pregnancies are delivered in tertiary healthcare centers.

In this study, the maximum percentage of LBW babies were born to mothers with age <20 years (57.1%), which is comparable with the studies done by Agarwal et al.,<sup>[5]</sup> Raman,<sup>[8]</sup> and Negi et al.,<sup>[9]</sup> who also observed that the prevalence of LBW was more among mothers with age <20 years.

The proportion of LBW was more (56.3%) among illiterate mothers, which is similar to the findings of the study by Joshi et al.,<sup>[10]</sup> and Anand and Garg.<sup>[11]</sup> This may be because of an increased awareness about the health services in educated mothers.

This study showed that the proportion of LBW babies was high among working women (48.0%); similar observations were found in studies done by Joshi et al.,<sup>[10]</sup> Anand and Garg,<sup>[11]</sup> and Mondal.<sup>[12]</sup> This might be owing to an increased physical activity and less rest by working women when compared with housewives.<sup>[13]</sup>

**Table 1:** Association between the various maternal factors with low birth weight

Factors	LBW, n (%)	Normal, n (%)	Total, n (%)	Unadjusted odds ratio (CI)	p
Age of the mother (years)					
<20	24 (57.1)	18 (42.9)	42 (100)	5.6471 (2.5172–12.6684)	0.0001*
≥20	17 (19.1)	72 (80.9)	89 (100)		
Mothers' education					
Illiterate	9 (56.3)	7 (43.8)	16 (100)	3.3348 (1.1454–9.7090)	0.0216*
Literate	32 (27.8)	83 (72.2)	115 (100)		
Mothers' occupation					
Working women	24 (48.0)	26 (52.0)	50 (100)	3.4751 (1.6081–7.5099)	0.0012*
Housewife	17 (21.0)	64 (79.0)	81 (100)		
Parity					
Multi	16 (32)	34 (68)	50 (100)	1.0541 (0.4937–2.2507)	0.8916
Primi	25 (30.9)	56 (69.1)	81 (100)		
Maternal weight gain during pregnancy (kg)					
<6.5	13 (92.9)	1 (7.1)	14 (100)	41.3214 (5.1734–330.0466)	0.00001*
≥6.5	28 (23.9)	89 (76.1)	117 (100)		
Day time rest during pregnancy (h)					
<2	30 (66.7)	15 (33.3)	45 (100)	13.6364 (5.6235–33.0677)	0.00000*
≥2	11 (12.8)	75 (87.2)	86 (100)		
Hemoglobin level (g/dL)					
<11	24 (64.9)	13 (35.1)	37 (100)	8.3620 (3.5553–19.6670)	0.00000*
≥11	17 (18.1)	77 (81.9)	94 (100)		
Birth interval (n = 41) (years)					
<2	11 (73.3)	4 (26.7)	15 (100)	41.2500 (6.5998–257.8220)	0.0001*
≥2	2 (6.3)	30 (93.8)	32 (100)		

This study revealed that 92.9% LBW babies were born to the mothers with maternal weight gain below 6.5 kg. Similar results have been observed by Agarwal et al.<sup>[5]</sup> and Chhabra et al.<sup>[14]</sup> in their studies. In this study, the proportion of LBW

babies was more (66.7%) among mothers who took day time rest less than 2 h in a day. This was similar to the study done by Choudhary et al.<sup>[6]</sup> The study also showed that the proportion of LBW babies was 64.9% among anemic mothers, which

**Table 2:** Multivariate logistic regression of the factors associated with low birth weight

Factors	LBW, n (%)	Normal, n (%)	Total, n (%)	Adjusted odds ratio (CI)	p
Age of the mother (years)					
<20	24 (57.1)	18 (42.9)	42 (100)	0.3116 (0.1029–0.9434)	0.0391*
≥20	17 (19.1)	72 (80.9)	89 (100)		
Mothers' education					
Literate	32 (27.8)	83 (72.2)	115 (100)	1.592 (0.3394–7.4618)	0.5552
Illiterate	9 (56.3)	7 (43.8)	16 (100)		
Mothers' occupation					
Housewife	17 (21.0)	64 (79.0)	81 (100)	2.4604 (0.8298–7.2953)	0.1045
Working women	24 (48.0)	26 (52.0)	50 (100)		
Maternal weight gain during pregnancy (kg)					
<6.5	13 (92.9)	1 (7.1)	14 (100)	16.8831 (1.6763–170.0355)	0.0165*
≥6.5	28 (23.9)	89 (76.1)	117 (100)		
Day time rest during pregnancy (h)					
<2r	30 (66.7)	15 (33.3)	45 (100)	5.3334 (1.8426–15.4376)	0.002*
≥2	11 (12.8)	75 (87.2)	86 (100)		
Hemoglobin level (g/dL)					
<11	24 (64.9)	13 (35.1)	37 (100)	4.6063 (1.5037–14.1103)	0.0075*
≥11	17 (18.1)	77 (81.9)	94 (100)		
Birth interval (n = 41) (years)					
<2	11 (73.3)	4 (26.7)	15 (100)	1.2800 (0.5573–2.9401)	0.5607
≥2	2 (6.3)	30 (93.8)	32 (100)		

is comparable with the studies done by Agarwal et al.<sup>[5]</sup> and Mavalankar et al.<sup>[15]</sup>

It was observed in this study that the proportion of LBW babies was high (73.3%) in the mothers whose interval between the present pregnancy and previous pregnancy was <2 years, and this result was supported by other studies.<sup>[5,10,15]</sup> This may be explained by the deterioration of nutritional status in the present pregnancy, because of the previous delivery and breast feeding. This study also revealed that mothers who presented a history of tobacco chewing delivered more LBW babies, and a similar observation was found in the studies done by Agarwal et al.<sup>[5]</sup> and Mehta and Shukla.<sup>[16]</sup>

## Conclusion

Thus, this study concluded that the problem of LBW is multidimensional. Hence, we need integrated and comprehensive approaches, which institute a combination of interventions to improve the overall health of the women. Such approaches are likely to be most effective in reducing the LBW problem in India. Therefore, our study recommends the proper health education in the following manner in order to reduce the proportion of LBW:

- Health education to adolescents: regarding the nutrition and marriage age.
- Health education to married women: regarding the nutrition and age of first pregnancy.
- Health education to pregnant women: regarding the nutrition, regular antenatal checkup, regular intake of iron and folic acid tablets, birth spacing, family planning, and, finally, about avoiding habits such as tobacco chewing.

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