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Risk Factors Associated with Low Birth Weight among Deliveries at Bharatpur Hospital

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ABSTRACT

Background: Babies with a birth weight of less than 2500 grams, irrespective of the period of their gestation are termed as Low Birth Weight (LBW) babies. Despite consistent efforts to improve the quality of maternal and child health, more than twenty million low birth-weight (LBW) babies are born every year throughout the world. Though, the health situation of Nepal has improved substantially over the years, the low birth-weight (LBW) rate is still high. The objective of this study was to assess the proportion of low birth weight and identify the associated factors for low birth weight in a live born infant among the institutionally delivered newborns.

Methods: A hospital based cross sectional study was conducted in Obstetrics and Gynaecology ward of Bharatpur hospital, Bharatpur, from 17th September to 4th October , 2012. Altogether 480 respondents were taken and respondents were mothers who had delivered newborns in Bharatpur hospital.

Results: A total of 480 births occurred during the study period, of which 480 met the study criteria. Among which 9.4% were low birth weight and 90.6% were normal birth weight .Overall mean birth weight was found to be 2.96 kg. Out of total 9.4% newborns were weighing less than 2.50 kg and mean birth weight 2.96kg.

Conclusions: This study suggests that there were several factors interplaying which lead to LBW babies; which are age of mother at delivery,weight gain by mother during pregnancy, short, low body mass index and hyperemesis gravidarum was the strongest predictor in this study.

Keywords: Antenatal care; low birth weight; maternal and child health services; maternal risk factors; newborn.

INTRODUCTION

Low birth-weight is a weight at birth less than 2,500 grams irrespective of gestational age.[1] More than 20 million infants worldwide, representing 15.5 percent of all births are born with low birth-weight (LBW), 95.6 percent of them in developing countries. Half of all low birth-weight babies are born in South-central Asia, where more than a quarter (27 per cent) of all infants weigh less than 2,500 gram at birth.[2] In Nepal, 21%, 14% and 11.5% of low birth-weight babies was reported in DHS 2001, 2006 and 2011 respectively.[3]

The main causes of LBW include infection, maternal malnutrition, and smoking, as well as prematurity, multiple pregnancy, high parity, and complications of pregnancy such as preeclampsia.[4] Evidence also shows that other less-known environmental factors can affect fetal growth.[5] In 2010, a total of 10.9 million births were preterm and appropriate-for-gestational age, 29.7 million births were full term and small-for-gestational age (SGA), and 2.8 million births were preterm and SGA among the total 135 million births in developing countries.[6] Seventy-two percent of LBW infants in developing countries are born in Asia. [7]

The present study was to explore the effects of various maternal risk factors associated with low birth-weight of institutionally delivered newborns.

METHODS

A hospital based analytical cross sectional study was conducted in the Gynaecology and Obstetrics ward in Bharatput hospital, Chitwan, Nepal from 17th September to 4th October, 2012. By taking confidence interval of 95% and permissible error of 0.05 and "P" as 0.34 the number of sample size was 480. We interviewed 480 respondents (10% more than sample size) to consider none response, but all mothers agreed for the interview.

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A pretested schedule was used to record the information. Prestesting was done in Maula Kalika Hospital, Chitwan. Record review format were used for reviewing antenatal care cards. A spring type weighing machine scale was used to measure birth weight of the babies. Each questionnaire was completed and birth weight was taken after birth within 24 hours of birth. Maternal nutritional status was assessed by post-partum weight and hemoglobin level recorded before delivery. Information about maternal hemoglobin, gestational age and morbidity during pregnancy and other required data were taken from the medical records. Antenatal care practice was defined as the women received at least one antenatal check-up while pregnant. The Birth interval was taken as the space between two births and recorded by asking the mothers, the age of her elder child just before the recent child. The mothers who were able to read and write were taken as literate.

In this study information was collected regarding medical and non-medical maternal risk factors associated with low birth-weight. Quality of data was cross-checked at various stages of study. First questionnaire was completed then thoroughly checked by the researcher himself. These questionnaires were brought home for further checking, coding, processing, data entry and analysis. Data was coded, compiled and analyzed in Statistical Package for Social Sciences (SPSS) version 20 software. Simple descriptive analysis, chi-square test was used to determine the risk factors. Fisher's exact test was applied when sample sizes were small. Univarible and multi variable analysis was done. Logistic regression analysis was used to assess relationship between birth weight and other associated factors. Logistic regression results were reported as odds ratio along with P- value.

The research was approved by the Institutional Review committee of Chitwan Medical College; each respondent was briefed shortly on the objective of the study and taken verbal consent before interview. The collated data was kept confidential.

RESULTS

A total of 500 births occurred during the study period of which 480 met the study criteria. Among which 9.4% were low birth weight (LBW) and 90.6% were normal birth weight (NBW). Hence, the prevalence of low birth weight newborns in the present study was found 9.4%. Overall mean birth weight was found to be 2.96 kg.

Table 2, 3 & 4 show the results LBW babies mostly 17.3% came from the mother of ≤19 years age group women while 7.8% LBW babies delivered from mother of ≥20 years age group. Among the total respondents, 1.5% mothers were illiterate. 7.2% babies who were LBW belonged to housewife occupation. Percentage of LBW babies was minimum (8.7%) in mothers of high income group (per capita income of family more than NRs. 100000 per year). Association between age of mother and educational status was found to be significant.

Out of 190 births, birth interval in relation to previous birth was found to be ≤23 months in 7.9% mothers. In these mothers, 20.0% of newborns were LBW and different findings were found in mothers who had birth interval ≥ 24 months.

Out of the total 480, 36 mothers had height less than 145 cm; out of them, 19.4% LBW babies were delivered. Out of 5 mothers who weight, less than 45 kg, 20% babies with low birth weight were delivered. Mothers who had weight gain during pregnancy of less than 10 kg, had highest low birth weight babies (17.4%). Mothers height and weight gain during pregnancy were statistically significant. There was no significant association between hemoglobin level and illness during pregnancy.

The utilization of antenatal care was in 89.58% mothers. LBW was found to be 25% in mothers who did not receive any antenatal care and who received antenatal care was 9.2%. Out of 480, 50 mothers had hyper-emesis gravidarum during pregnancy among them 13 babies (26%) were LBW babies. Hyper-emesis gravidarum was statistically significant with LBW (p=0.000).

Table 1. Newborn by their birth weight.

Birth weight (grams)	No of Newborns	Percentage
1500-2499	45	9.4
≥2500	435	90.6

Table 2. Relationship between socio-economic factors and birth weight of newborn.

Variables	Birth weight		p-value
	LBW (n %)	NBW (n %)	
Age			
≤ 19 years	14 (17.3)	67 (82.7)	0.007*
≥ 20 years	31 (7.8)	368 (92.2)	
Caste			
Upper caste group	17 (7.7)	204 (92.3)	0.180
Disadvantaged Janajatis	16 (10.9)	131 (89.1)	
Dalit	9 (15.8)	48 (84.2)	

Relatively advantage			
Janajatis	3(5.5)	52(94.5)	
Religion of the mother			
Hindu	41 (9.9)	372 (90.1)	0.373
Non-Hindu	4 (6)	63 (94)	
Occupation			
Housewife	6 (7.2)	77 (92.8)	0.461
Other	39 (9.8)	358 (90.2)	
Education			
Illiterate	4 (57.1)	3 (42.9)	0.002*
Literate	41 (8.7)	432 (91.3)	
Education status			
Informal and primary	9 (12.2)	65 (87.8)	
Secondary	15 (11.1)	120 (88.9)	0.232
SLC pass	7 (5.3)	126 (94.7)	
+2 and above	10 (7.6)	121 (92.4)	
Family type			
Nuclear	13 (11.1)	104 (88.9)	0.459
Joint	32 (8.8)	331 (91.2)	
Yearly income			
≤100000	11 (12.5)	77 (87.5)	0.266
>100000	34 (8.7)	358 (91.3)	

**Significant at <0.05, [2] denotes Fisher's exact test*

Table 3. Relationship of birth weight of baby with selected variables (n=480).

Variables	Birth weight		p-value
	LBW (n%)	NBW (n%)	
Birth order of child[2]			
≤2 second	41 (9.8)	377 (90.2)	0.491
> Second	4 (6.5)	58 (93.5)	
Sex of child			
Male	19 (7.1)	250 (92.9)	
Female	26 (12.3)	185 (87.7)	0.050
Preference sex of child			
Male	22 (8.2)	247 (91.8)	
Female	9 (13.2)	59 (86.8)	0.433
Whatever	14 (9.8)	129 (90.2)	
Birth spacing[2] (n=190)			
≤23 months	3 (20.0)	12 (80.0)	0.071
≥24 months	10 (5.7)	165 (94.3)	

[2]denotes Fisher's exact test

Table 2 and 3 reflects the results of univariate analysis of maternal factors associated with LBW. The factors associated with LBW include age, education, sex of the child, birth spacing, birth order of the child. The following variables were found age of the mother and education level of mother. Other variables found were insignificant.

Table 4. Relationship of birth weight of baby with selective variables.

Variables	Birth weight		p-value
	LBW (n%)	NBW (n%)	
ANC visit[2]			
Yes	44 (9.2)	432 (90.8)	0.326
No	1 (25.0)	3 (75.0)	
Mother's height			
<145cm	7 (19.4)	29 (80.6)	0.022*
≥145cm	34 (8.1)	386 (91.9)	
Maternal weight[2]			
<45kg	1 (20.0)	4 (80.0)	0.377
≥45kg	40 (8.9)	411 (91.1)	
Weight gain			
<10kg	34 (17.4)	161 (82.6)	0.000*
≥10 kg	7(2.7)	254(97.3)	
BMI			
<18.5-24.9	29 (15.6)	157 (84.4)	0.000*
≥25	12(4.4)	258(95.6)	
Hemoglobin (n=281)			
<11.5 gm/dl	20 (11.4)	155 (88.6)	0.055
≥11.5 gm/dl	5 (4.7)	101 (95.3)	
Hyper emesis gravidarum			
Yes	13(26.0)	37(74)	0.000*
No	32(7.4)	398(92.6)	
Disease			
Yes	5 (9.3)	49 (90.7)	0.975
No	40 (9.4)	386 (91.6)	

**significant at <0.05, [2] denotes Fisher exact test.*

Table 5. Multivariable analysis using logistic regression for significantly associated factors for birth weight (n=480).

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age of mother		
≤19 years	1	1
≥20 years	0.403 (0.20-0.79) *	0.708 (0.31-1.60)

Education		
Illiterate	1	1
Literate	0.071 (0.01-0.32) *	0.086 (0.01-0.77)
Maternal height (n=456)		
<145cm	1	1
≥145cm	0.365 (0.14-0.89) *	0.610 (0.21-1.76)
Weight gain (n=456)		
<10kg	1	1
≥10kg	0.131 (0.05-0.30) *	0.218 (0.08-0.55) *
BMI (n=456)		
18.5-24.9 kg/m^2	1	1
≥25 kg/m^2	0.252 (0.12-0.50) *	0.445 (0.19-0.99)
Hyper emesis gravidarum		
Yes	1	1
No	0.229 (0.11-0.47) *	0.323 (0.14-0.74) *
*significant at <0.05		

Multivariable analysis (multiple logistic regressions) revealed that significant factors were weight gain during pregnancy and hyper-emesis gravidarum.

DISCUSSION

LBW is a public health problem linked to a wide range of possible predictors, which are sometimes difficult to handle. Despite efforts to decrease the proportion of newborns with LBW, success has been quite limited and the problem persists in both developing and developed countries. [8]

This study revealed that LBW was nearly 10% of all live births, which is less than what was observed in a hospital-based study (29.8%) in the Western Region Hospital, Pokhara, Nepal, and in Kathmandu. [9, 10] The estimated LBW in Nepal is 21%, in comparison with the regional estimates of LBW of 25% in South Asia in 2001. [11] The proportion of LBW is high in Nepal and is recognized as a national health problem. The main cause of LBW in Nepal is the prevalence of undernourished women, exacerbated by low dietary intake during pregnancy. Iron supplementation may improve maternal appetite, [12] thereby increasing energy consumption during pregnancy, with resultant increased intrauterine growth. In this study, almost all mothers had taken iron tablets during pregnancy.

The present study found that 9.4% of birth weight were below the normal range(<2500gm), 79.4% were within normal range (2500gm-3500gm) and 11.2% were above the normal range (>3500gm). The prevalence of low birth weight was found to be nearly similar to the national average 12%, in comparable with NDHS 2001.[6,14] It was observed that low birth weight of baby was higher among those mother who had the age less than or equal to 19 years in comparison to age group more than or equal to 20 years.[12,15-17]

In the present study, the higher percentage of low birth weight was found in nuclear family than the joint family. However, the difference was not statistically significant. This finding is similar with the result of the previous study which concludes that the type of family had no any significant difference with birth weight of baby.[15,13]

The percent of low birth weight of baby was higher among mother of housewife occupation in comparison to other occupations. However, the occupation of mother was not statistically significant with the birth weight in the present study. The findings of study was supported by the previous study.[17]

The univariate analysis showed a significant relationship between birth weight and mother's literacy, indicating that literate mothers were more likely to give normal birth weight babies than the illiterate mother. A similar study showed that LBW decreased with rising education level of mother.[18] Similarly, the mother's educational status was found to be significantly associated with low birth weight of babies in Bangladesh and Philippines.[15, 19,20]

This study revealed low birth weight of babies was higher among the mothers who had a height of less than 145 cms weight gain of less than 10 kg during pregnancy which was statistically significant, along with BMI of mother. Haemoglobin level of the mother was not statistically significant with the birth weight of the baby. Similar findings as low birth weight were significantly associated with Hemoglobin level and BMI.[21]

CONCLUSIONS

The study concluded that the chances of LBW was higher among those mothers who were short (height <145cm); weight gain of mother during pregnancy (<10kg); Low BMI; hyperemesis gravidarum. It is important to strengthen health education, along with conducting nutrition programs for mothers and developing fetal programming in Nepal.

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