

# Factors associated with low birth weight among the babies delivered at maternity hospital

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## ABSTRACT

**Background:** Neonates with a birth weight of less than 2500 g have a higher risk of morbidity and mortality than the babies of normal birth weight. Various factors may play the role in the incidence of low birth weight babies.

**Objectives:** The objective of the study was to find out the factors associated with low birth weight in a maternity hospital.

**Methods:** A case control study was conducted at Paropakar Maternity and Women's Hospital Kathmandu. Non probability consecutive sampling method was applied in which the total study sample was 136. Among them 68 full term low birth weight babies as case and equal number of full term normal birth weight babies were included as control. Descriptive and inferential statistics were used for data analysis.

**Results:** Half (50.0%) of the case mothers had history of previous low birth weight babies in comparison to 3.0% of the control mothers who had history of previous low birth weight babies. In regards to history of previous birth interval, 25.0% of cases and 3.0% of control mothers had history of previous birth interval of less than two years. Among those who had ANC visits, 40.0% of cases and 14.3% of controls had inadequate Antenatal visit during their last pregnancy. Study found a significant association of low birth weight with smoking during pregnancy ( $p = 0.029$ ) history of previous child with term LBW ( $p = 0.001$ ), birth spacing ( $p = 0.009$ ) and antenatal visit during pregnancy ( $p = 0.001$ ) among the case mothers.

**Conclusions:** The study concludes that the incidence of low birth weight babies tends to be higher among the mothers with history of smoking during pregnancy, with birth spacing of less than two years, and who had less than four antenatal visits.

**Key words:** Low Birth Weight, Morbidity, Mortality

## INTRODUCTION

Low birth weight (LBW) i.e. a birth weight of less than 2500 g is a strong indicator of maternal and newborn health and nutrition. Birth weight is one of the major factor in determining child survival and growth and development<sup>1</sup>. Low birth weight remains a significant public health problem in both developing and developed countries. LBW babies have a higher risk of morbidity and mortality relative to the risk in an infant of normal birth weight. These babies are at an increased risk of asphyxia, hypoglycaemia, polycythaemia, hyper viscosity and hypothermia and are more prone to have impaired neurodevelopment and diabetes mellitus in adult life<sup>2</sup>. LBW is a common problem of the developing

world, which is an important factor for perinatal mortality and morbidity. Maternal height, haemoglobin, total weight gain and antenatal clinic visit were found to be significant risk factors contributing to LBW<sup>3</sup>.

The reduction of LBW also forms an important contribution to the Millennium Development Goal (MDG) – 4 for reducing child mortality. The government has set a long-term goal to decrease percentage of newborns weighing less than 2500 g to 12% by the year 2017<sup>4</sup>. The top five factors associated with LBW in Nepal are low maternal weight, low maternal height, low maternal body mass index, birth of previous preterm infant and a birth interval of less than two years<sup>5</sup>. Other factors are anaemia, adolescent pregnancy, maternal illiteracy, rural residence and inadequate antenatal care<sup>6</sup>.

LBW has long term consequences. LBW babies who survive have impaired immune function and increased risk of disease. They are likely to remain undernourished,

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with reduced muscle strength throughout their lives, and to suffer a higher incidence of diabetes and heart disease. Children born underweight also tend to have cognitive disabilities and a lower IQ, affecting their performance in school and their job opportunities as adults<sup>7</sup>.

Primary prevention of LBW by early identification of risk factors and implementation of risk specific intervention are key components of effective preventive programmes. Therefore, the objective of this study was to find out the association of selected behavioural and obstetric factors of the mothers with LBW. The information would be beneficial to undertake effective measures to reduce incidence of low birth weight babies.

## METHODS

A case control design was used to conduct the study. Study was conducted in the postnatal ward of the Paropakar Maternity and Women's Hospital. Cases included newborns who were full term LBW (birth weight less than 2500 gram) and control included full term normal birth weight (NBW), (birth weight 2500 – 4000 g) newborns delivered on the same days in the same hospital at the ratio one control for each case.

Data was collected by interviewing mothers in the postnatal ward by using the pretested Nepali version semi-structured questionnaire. The period of data collection was from August 22 to September 16, 2011. A total of 68 full time LBW babies were included as cases using non-probability consecutive sampling technique. Equal number of full term NBW were included as controls with a total sample being 136. The exclusion criteria set both in selection of cases and controls were mothers who could not respond to interview and babies who had birth defects, multiple births or those delivered by caesarean section.

The obtained data were coded and entered in SPSS 20.00 version and analysed by using descriptive statistics such as frequency, percentage and inferential statistics like Chi-square test to find out the significant association between selected variables among cases and controls.

## RESULTS

Table 1 presents the socio-demographic information of the mothers of cases and controls. It reveals that majority of the mothers of cases as well as controls (72.0% and 88.2% respectively) belonged to 20-35 years age group and majority (78% and 85.3% respectively) was literate. In regards to residence majority (82.4%)

of cases belonged to rural residence whereas majority (55.9%) of the controls belonged to urban residence.

In regards to ethnicity, majority (52.9%) of the cases were Brahmin/Chhetri group whereas majority (57.3%) of the controls was Mongolian/Newar. In regards to religion, majority of the cases as well as controls belonged to Hindu religion (83.8% and 75.0% respectively). Mother's occupation was predominantly housework in both cases and controls (72.1% and 70.6% respectively). From the point of view of the economic status majority (63.2%) of the cases were from low economic status i.e. their income is insufficient to fulfill their day to day expenditure. Majority (70.6%) of the controls were from middle to high economic status i.e. they have sufficient or more than sufficient income for their day to day expenditure. Regarding family type both cases and controls were from nuclear families (61.8% and 75.0% respectively).

Table 2 presents the behavioural factors of the cases and controls and their association with LBW. As can be seen from the table, 17.6% of case and 4.4% of control mothers had history of smoking during pregnancy and Chi square test revealed a significant association between smoking during pregnancy and incidence of LBW ( $p=0.029$ ), (OR 4.6; 95 percent CI, 1.2 -17.3). Similarly, 16.2% of case and 8.8% of control mothers had history of alcohol consumption during pregnancy. However, its association with incidence of LBW was not statistically significant.

Table 3 shows that half (50.0%) of the cases had history of previous LBW whereas only 3.0% of the control mothers had history of previous LBW. In regards to history of previous birth interval, 25.0% of cases and 3.0% of control mothers had history of previous birth interval of less than two years. LBW was significantly associated with history of previous delivery of term LBW ( $p=0.001$ ) (OR 32; 95% CI, 3.7-273.4) and history of less than two years birth spacing ( $p=0.009$ ) (OR 10.6; 95% CI, 1.9-105.1).

Table 4 indicates the antenatal visit related information of mothers of cases and controls. Most of the cases as well as controls had antenatal clinic (ANC) visits during their last pregnancy (95.6% and 92.6% respectively). Among those who had ANC visits, 40.0% of cases and 14.3% of controls had inadequate ANC visits during their last pregnancy. Inadequate number (three or less) of ANC visit was significantly associated with LBW ( $p=0.001$ ), (OR 4; 95% CI 1.9 -9.4).

**Table 1: Socio-demographic characteristics of the cases and controls**

Characteristics	Cases ( n= 68) Number (%)	Controls (n =68) Number (%)
<b>Age of mother (years)</b>		
< 20	15 (22.0)	7 (10.3)
20-35	49 (72.0)	60 (88.2)
≥35	4 (6.0)	1 (1.5)
Mean±SD	23.2±4.5 years	24.6±4.4years
<b>Education status</b>		
Illiterate	15 (22.0)	10 (14.7)
Literate	53 ( 78.0)	58 (85.3)
<b>Residence</b>		
Rural	56 (82.4)	30 (44.1)
Urban	12 (17.6)	38 (55.9)
<b>Ethnicity</b>		
Bhramin/Chhetri	36 (52.9)	26 (38.2)
Mongolian/Newar	29 (42.6)	39 (57.4)
Dalit	3 (4.5)	3 (4.4)
<b>Religion</b>		
Hindu	57 (83.8)	51 (75.0)
Buddhist	10 (14.7)	16 (23.5)
Muslim	1 (1.5)	1 (1.5)
<b>Occupation</b>		
Housework	49 (72.1)	48 (70.6)
Outside work (Service, business etc.)	19 (27.9)	20 (29.4)
<b>Economic status</b>		
Lower	43 (63.2)	20 (29.4)
Middle/ higher	25 (36.8)	45 (70.6)
<b>Family structure</b>		
Nuclear	42 (61.8)	51 (75.0)
Joint	26 (38.2)	17 (25.0)

**Table 2: Association of smoking and drinking habit of mothers with LBW**

Variables	Cases (n=68) Number (%)	Controls (n=68) Number (%)	Odds Ratio (95% CI)	p - value
<b>Smoking during pregnancy</b>				
Yes	12 (17.6)	3 (4.4)		
No	56 (82.4)	65 (95.6)	4.6 (1.2 -17.3)	0.029
<b>Alcohol consumption during pregnancy</b>				
Yes	11 (16.2)	6 (8.8)		
No	57 (83.8)	62 (91.2)	1.9 (0.7 -5.7)	0.150

**Table 3: Association of previous term LBW and short birth interval with present LBW babies**

Variables	Cases (n=24) Number (%)	Controls (n= 33) Number (%)	Odds Ratio (95%CI)	p value
<b>History of previous child with term LBW</b>				
Yes	12 (50.0)	1 (3.0)	32	
No	12 50.0)	32 (97.0)	(3.7 -273.4)	0.001
<b>History of previous &lt;two years birth interval</b>				
Yes	6 (25.0)	1 (3.0)	10.6	
No	18 (75.0)	32 (97.0)	(1.9 -105.1)	0.009

**Table 4: Association between antenatal visit among mothers and birth weight of babies**

Variables	Cases (n=68) No. (%)	Controls (n=68) No. (%)	Odds Ratio 95% CI	p value
<b>Antenatal visit</b>				
Yes	65 (95.6)	63 (92.6)	1.7	0.466
No	3 (4.4)	5 (7.4)	(0.4 -7.5)	
<b>If yes, number of ANC visit</b>				
Inadequate (1- 3)	26 (40.0)	9 (14.3)	4	0.001
Adequate (≥ 4)	39 (60.0)	54 (85.7)	(1.7-9.5)	

## DISCUSSION

Majority of the mothers in this study both in cases (72%) and controls (88.2%) were in the age group of 20- 35 years when the child was born. This may be probably because 20- 35 years of age group is the most fertile age group. Majority (82.4%) of the cases was from rural residence whereas majority (55.9%) of controls was from urban residence Majority (i.e. 78% and 85.3%) of the mothers of cases and controls respectively were literate. Regarding mothers occupation 72.0% of the mothers in case group and 70.6% in the control group are engaged in housework

This present study found that, the proportion of LBW was more among mothers who smoked during pregnancy (17.6%) in contrast to controls (4.4%). Babies born to mothers who smoked during pregnancy are 4.6 times more likely to have low birth weight babies than those who did not smoke during pregnancy (OR: 4.6; CI:1.2-17.3). This finding is supported by the finding of the study conducted by McKenzie, Pinger and Koteck (2002)<sup>8</sup> which also showed that smoking during pregnancy was linked to LBW babies (30-40%), where the incidence of LBW among smoking mothers was more than twice that of non-smokers. This study reveals that there was a significant association between smoking during pregnancy and birth weight ( $p=0.029$ ).

Regarding alcohol consumption habit during pregnancy, 16.2% of the case mothers who consumed alcohol during pregnancy had LBW in contrast to 8.8% of the control mothers but no significant association was revealed. This finding is similar to the findings of Boo, Lim, Koh, Lau and Ravindran (2008)<sup>9</sup> as in his study there was no significant difference in the proportion of mothers with alcohol consumption habit between cases and controls.

Birth weight of babies was significantly ( $p =0.001$ ) associated with history of previous child delivery of term Low birth weight. Half (50.0%) of the case mothers who delivered LBW baby had history of previous delivery of term LBW in contrast to 3.0% of the control mothers

had history of previous delivery of LBW. Babies born to mothers who had delivered previous term with low birth weight babies are 32 times more likely to have low birth weight babies than those mother who did not have delivered previous term with low birth weight babies (OR: 32; CI:3.7-273.4).

The proportion of cases with history of short birth interval was 25.0% in compare to 3.0% in the controls. This difference was significantly associated ( $p=0.009$ ). Mothers who had less than two years of birth interval are 10.6 times more likely to have low birth weight babies than those mother who had more than two years of birth interval (OR: 10.6; CI:1.9-105.1).

This finding is consistent with the findings of the study conducted by Velankar (2009)<sup>10</sup> in which less than two years spacing between two pregnancies had a higher incidence of LBW (i.e. 76.5%). Similar finding was shown in a study by Zhu, Rolfs, Nangle & Horan (1999)<sup>11</sup> which suggested that short inter-pregnancy interval result in depletion of maternal nutrient stores and lead to reduced birth weight. But study finding of the present study is contradicted by the study finding of Hosain et al. (2005)<sup>12</sup> where they found no significant association between shorter inter-pregnancy spacing and birth weight.

In the same way, regarding antenatal clinic visit during pregnancy, this study found 40.0% of the mothers among cases had incomplete (only 1-3 times) antenatal visits in contrast to 14.3 % of the mothers among control who had inadequate antenatal visits. This finding was significantly associated ( $p=0.001$ ). Mothers who had inadequate Antenatal care visit are 4 times more likely to have low birth weight babies than those mother who had adequate Antenatal care visit (OR: 4; CI:1.7-9.5). The study conducted by Singh, Shrestha and Marathatta (2010)<sup>3</sup> also showed that 32.2% mothers who had LBW had inadequate ANC visits in comparison to mother who had 4 or more ANC visit during their pregnancy. Adequate ANC visit helps in the early identification of maternal medical conditions and also provides antenatal care which helps in early and prompt

intervention and reduces complications, so it might have resulted in reduction of low birth weight babies.

## CONCLUSION

On the basis of the findings, it can be concluded that the incidence of low birth weight babies tend to be higher

among the mothers, with history of smoking during pregnancy, with birth spacing less than 2 years, and who had inadequate antenatal visits. So, in order to prevent low birth weight babies, health awareness should be focused on no smoking during pregnancy, birth spacing of at least two years, complete antenatal clinic visit.

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