PREDICTORS OF LOW BIRTH WEIGHT NEONATES DELIVERED IN A HOSPITAL OF RUPANDEHI, NEPAL

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ABSTRACT

INTRODUCTION

Low birth weight has been defined by World Health Organization (WHO) as weight at birth of <2500 grams (5.5 pounds). Low birth weight is more common in developing than developed countries. Intrauterine growth restriction, prematurity or both cause low birth weight. It contributes to a range of poor health outcomes and it is closely associated with fetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and Non-communicable Diseases (NCDs) later in life. Low birth weight infants are about 20 times more likely to die than heavier infants.

MATERIAL AND METHODS

A cross-sectional design was used to find out the prevalence and predictors of low birth weight among 327 singleton neonates delivered in a Universal College of Medical Sciences, Teaching Hospital, Bhairahawa, Nepal by using Enumerative sampling technique. Semi-structured, pre-tested interview and record report was used to collect data and analyzed by using descriptive and inferential statistics with SPSS version 16.

RESULTS

The study findings revealed that the prevalence of low birth weight is 28.5% and there is statistically significant association between parity (p<0.000), mode of delivery (p= 0.001), ANC visit (p=0.016), iron supplement (p<0.000), tablet calcium (p<0.000), tablet albendazole (p=0.023), food taboos (p=0.058), rest at night (0.000), alcohol (0.015) during pregnancy parity (p <0.000), mode of delivery (p=0.001), ANC visit (p=0.016), and low birth weight neonates.

CONCLUSION

The study concluded that the factors those were associated with low birth weight, which can be prevented at pregnancy period through good prenatal care and intervention programs such as health education on diet, rest, time to time check up, taking medicines, early identification of complication.

KEYWORDS

Prevalence, Predictors and Low birth weight neonates

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INTRODUCTION

Globally, the prevalence rate of low birth weight is more than 20 million, among them 96.5% LBW occur in developing countries.[1] However, the data is undocumented due to some significant portion of deliveries occurs in homes or small health facilities. It contributes to a range of poor health outcomes; for example, it is closely associated with fetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and NCDs later in life. Low birth weight infants are about 20 times more likely to die than heavier infants.[2]

Birth weight is an important indicator of a newborn's health. 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.[3] Seventy two percent of low birth weight neonates are born in developing countries in Asia.[4] In Nepal, LBW neonates comprised of 21.81% in 2016. The study conducted in different hospitals of Nepal to find out the prevalence of LBW are 11.07% in Dhulikhel Hospital[5], 23.1% in Koshi Hospital[6] and 11.99% in Patan Hospital respectively.[7]

Globally, neonatal mortality is 20 times more likely for low birth weight newborns when compared to normal weight newborns.[8] Low birth weight newborns are more prone to have a health problem and slower development from immediately to later life and extremely high rate of mortality and morbidity from infectious disease and underweight, stunting, or wasting from early neonatal period through childhood.[9] Low birth weight newborns usually need extra hospital care where there is a constant concern and uncertainty over future health outcomes.[10]

Low birth weight is associated with many socio-economic factors such as residence (urban-rural difference), mother's age and occupation, birth order, the family's income and many maternal conditions such as nutritional status, mother's educational and health status.[11] Known factors for pre-term delivery and fetal growth retardation, which are associated with LBW, include low maternal food intake and illness, especially infections. Studies suggest that short maternal stature, very young age, high parity, close birth spacing were all associated factors.[12,13]

MATERIAL AND METHODS

A cross-sectional design was used to find out the prevalence and predictors of low birth weight neonates delivered in a Universal College of Medical Sciences, Teaching Hospital, Bhairahawa, Nepal by using enumerative sampling technique to select the low birth weight neonates. Nepali version of semi-structured, pre-tested interview and record report of obstetric history and investigation during antenatal were used to collect data from the low birth weight neonates' mothers within four months of period (November 2020 to February 2021) and analyzed by using descriptive and inferential statistics with SPSS version [16].

Ethical approval was obtained from Institutional Review Committee (IRC) with the reference number UCMS/IRC/062/20 of Universal College of Medical Sciences, Teaching Hospital, Bhairahawa and administrative approval was obtained from the Medical Superintended of UCMS-TH, prior to data collection. Written informed consent was obtained from each mothers of low birth weight neonates by clarifying the objectives.

Exclusion criteria

The mothers who delivered twins neonates and had not any or complete record report of antenatal check up and were unable to give interview due to severe illness and not willing to participate in the study.

RESULTS

Table 1. Prevalence of low birth weight neonates

Variable	Frequency	Percentage
Total newborn delivered	1256	
Total low birth weight newborn	358	28.5%
Birth weight (n=358)		
Low birth weight (1501-2499)	250	69.8%
Very low birth weight (1001-1500)	108	30.1%

During data collection period 1256 newborns were delivered, among them 358 (28.5%) neonates were low birth weight. And among 358 low birth weight 69.8% were low birth weight and 30.1% were very low birth weight.

And only 327 neonates were met the inclusion criteria of the study. Out of 327 low birth weight neonates' mothers, (233) 71.3% were delivered low birth weight (1501-2499 grams) and 28.7% were delivered very low birth weight (<1501). Overall mean birth weight is found 1907.80±407.07.

Out of 327 mothers of low birth weight neonates, 90.8% were of the age group of 20–30 years and 3.1% were of less than 20 years of age, 89.6% were following Hindu religion and 60.9% resides in rural area, 74.3% were literate, 73.7% were homemaker and 46.2% of the mothers belonged to lower middle status. Majority (84.7%) of the mothers had mixed diet (non-vegetarian), 54.7% were living in joint family and 18.7% of the mothers had consanguinity marriage.

During pregnancy 75.8% of the mothers increased amount and 67.6% increased number of food during their pregnancy, 87.5% did not have any food taboos, 92.0% of the mothers had taken nap at daytime whereas 75.8% slept for 6 to 9 hours at nighttime, 0.9% of the mothers consumed alcohol and smoking during pregnancy respectively. Proportion of mothers with hemoglobin level more than 11 g/dl was 69.1%. Mean hemoglobin level of mothers was found to be 11.65 g/dl with a standard deviation of ±1.627.

The mothers 57.5% had planned their pregnancy, 51.4% were primipara, 57.8% mothers gave birth via caesarean section, 67.9% mothers were attended 4 or more times of ANC visit, 93.6%, 93.0%, 79.8% and 66.1% of the mothers took tablet calcium, tablet iron, tablet albendazole and tablet folic acid respectively. Proportion of mothers with a history

of abortion was 15.3%. Among multipara mothers, 4.0% had history of low birth weight neonates. Only 9.2% of the mothers had medical illness before pregnancy.

Out of 327 mothers, 39.1% had complication during pregnancy which was 12.5% had antepartum hemorrhage, 15.6%, 4.6% and 67.1% had pregnancy induced hypertension, premature rupture of membrane and others complications (fetal distress, oligohydramnios, malpresentation, meconium stained etc.) respectively. Among multipara respondents, 4.0% had history of low birth weight neonates. Only 9.2% of mothers had medical illness before pregnancy.

Table 2. Association between Pregnancy outcome and low birth weight neonates

Variable	Low birth weight	Very low birth weight	Test of association	*p*-value
Weeks of gestation				
Preterm	83	69		
Term	150	25	38.434*	<0.001
Sex of baby				
Male	118	49		
Female	115	45	0.059*	0.808
Intrauterine growth restriction (IUGR)				
Yes	21	9		
No	212	85	0.025*	0.873
Stillbirth				
Yes	3	4	2.507#	0.113
No	230	90		
Abnormality				
Yes	4	2		
No	229	92	0.061#	0.805

Level of significance *p*=>0.05,* chi-square test, #Likelihood test

Table 3. Association between respondents' socio-demographic variables and low birth weight neonates

Variable	Low birth weight	Very low birth weight	Test of association	*p*-value
Age				
<20 years	8	2		
>20 years	225	92	0.413#	0.520
Religion				
Hinduism	210	83		
Other than Hinduism	23	11	0.241*	0.623
Residence				
Rural	159	40		
Urban	110	18	1.946*	0.163
Educational Status				
Literate	175	68		
Illiterate	58	26	0.269*	0.604
Occupation				
Homemaker	171	70		
Employed	62	24	0.040*	0.841
Socioeconomic status				
Upper and upper middle	28	7		
Lower middle	102	49		
Lower and lower middle	103	38	2.541*	0.281
Family type				
Joint	134	45		
Nuclear	99	49	2.511*	0.113
Type of diet				
Non Veg	197	80		
Veg	36	14	0.016*	0.899
Consanguineous marriage				
No	191	75		
Yes	42	19	0.211*	0.646

Level of significance p=>0.05, *chi-square test, #Likelihood test

Table 4. Association between respondents' basic information during pregnancy and low birth neonates

Variable	Low birth weight	Very low birth weight	Test of association	*p*-value
Increase amount of food				
Yes	177	71	0.007*	0.934
No	56	23		
Increase number of food				
Yes	157	64		
No	76	30	0.015*	0.902
Food taboos				
Yes	24	17		
No	209	77	3.701*	0.054
Rest during day time				
Yes	19	7		
No	214	7	0.046*	0.830
Rest at night				
6-9 hours	177	71		
10-12 hours	56	23	0.007*	0.934
Alcohal				
Yes	-	4		
No	233	90	10.097#	0.002
Smoking				
Yes	2	1		
No	231	93	0.030#	0.862
Hemoglobin				
Moderate anemia	76	25		
No clinical anemia	157	69	1.138*	0.286

Level of significance *p*=>0.05, *chi-square test, #Likelihood test

Table 5. Predictors of low birth weight neonates related to maternal factors from logistic regression analysis

Variable	Reference category	Low birth weight	Very low birth weight	Odd ratio	95% CI for odd value Lower	Upper
Weeks of gestation	Preterm Term	83 150	69 25	4.826	2.703	8.616
Food taboos	Yes No	24 209	17 77	0.563	0.241	1.317
Alcohol	Yes No	- 233	4 90	0.601	0.327	1.106
Mode of delivery	CS NVD	144 89	45 49	0.569	0.309	1.047
ANC visits	<4 visits 4 or more visits	59 168 6	36 54 4	0.584	0.332	1.028
Iron supplement	Yes No	222 11	82 12	5.308	1.109	25.402
Calcium	Yes No	222 11	84 10	1.287	0.114	7.915
Pregnancy associated illness	Yes No	27 206	21 73	0.455	0.225	0.919

Level of significance *p*=>0.05, *chi-square test, #Likelihood test

Above table shows child and antenatal and obstetric factors for low birth weight. Gestational age of the fetus on the risk of having low birth weight babies, the odds of being LBW in babies born before gestational age of 37 weeks was 4 times higher when compared to babies born at gestational weeks and more (AOR= 4.826 (95% CI=2.703, 8.616).

Of the antenatal and obstetric factors, the odds of having LBW babies were high among mothers who had followed food taboos (AOR 0.563, 95% CI= 0.241, 1.317). Similarly, the odds of having LBW babies were high among mothers who consumed alcohol during pregnancy (AOR 0.601, 95% CI= 0.327, 11.106).

Likewise, risk of having LBW with cesarean delivery were higher (AOR 0.569, 95% CI 1.21–3.97) and the odds of having LBW babies were high among mothers who had not done ANC visit (AOR 0.584, 95% CI= 0.332, 1.028).

Mothers who did not take iron and calcium supplementation were more responsible for delivering low birth weight babies respectively (AOR 5.308, 95% CI= 1.109, 25.402; AOR 1.287, 95% CI= 0.114, 7.915).

The presence of any medical illnesses during current pregnancy was assessed and it was found to be associated significantly with LBW. The odds of being LBW in babies born from mothers with illness present during current pregnancy were found to have greater chance of delivering LBW baby when compared with mothers with no illness associated during pregnancy {(AOR = 0.455 (95% CI = 0.225, 0.919)}

DISCUSSION

The prevalence of low birth weight neonates was 358 (28.5%) among 1256 newborns delivered at a hospital. Out of 358, 69.8% were classified as low birth weight and 30.1% were classified as very low birth weight, overall mean birth weight is found 1907.80±407.07 grams. The prevalence of this study is inconsistent with the study where the prevalence of low birth weight newborns 21.56 % and is found consistent with the mean birth weight was 1.96 ± 0.409 kg., conducted in the Gynaecology and Obstetrics ward in Janakpur Zonal Hospital, Janakpur, Nepal from December 2009 to January 2010 where the prevalence of low birth weight newborns in the present study was found 21.56 %.[14] This study is inconsistent may be due to the setting that is Government hospital and teaching hospital.

The findings of the study suggest that among 327 low birth weight neonates, 46.5% were preterm and 4.0% were post term, 48.9% were male baby whilst 9.2% were intrauterine growth restriction and 1.2% of the child born with congenital abnormality. The findings is consistent that 49.5% were preterm, 48.9% were male baby and inconsistent that 29% were intrauterine growth retardation with the study conducted by Kayastha S and Tuladhar H.[15]

The finding shows that out of 327 neonates, 3.1% mothers were less than 20 years of age. This finding is inconsistent with the study done by Kayastha S and Tuladhar H.[15] that 15% were <20 years of age. 89.6% were following Hindu religion and 60.9% resides in rural area. Regarding educational status, 74.3% were literate, 25.7% were illiterate, and 73.7% were homemaker. According to the Kuppuswami socioeconomic status 0.9, 0.9% was lower and upper status, 46.2% were lower middle status, 42.2% were upper lower and 9.8% were belonged to upper middle socio economic status. Majority (84.7%) mothers had mixed diet (non.veg), 54.7% were living in joint family and 18.7% of the mothers had consanguinity marriage. This findings is consistent that 26% of babies born to illiterate mothers and inconsistent with the findings that 22% of babies born to mothers who were housewife of LBW. Proportion of LBW babies was minimum 8% in mothers of high-income group.[14]

The finding reveals that 57.5% of the mothers had planned pregnancy, 51.4% were primipara, 57.8% low birth weight delivered via caesarean section. This finding is consistent with the study by Kayastha, S and Tuladhar H[15] that 53% were primipara and inconsistent that 15.7% were delivered via cesarean section. Mothers 67.9% had 4 or more times ANC visit. Regarding supplementation during pregnancy, 93.6%, 93.0%, 79.8% and 66.1% of the respondents took calcium, iron, albendazole and folic acid respectively and 15.3% mothers had a history of previous abortion, 39.1% had complication during pregnancy which was 12.5% had antepartum hemorrhage, 15.6%, 4.6% and 67.1% had pregnancy induced hypertension, premature rupture of membrane and others complications respectively. This finding is inconsistent with the study that shows 5.8% antepartum hemorrhage, 7% pregnancy induced hypertension and 4.7% premature rupture of membrane.[15] Among multipara mothers, 4.0% had history of low birth weight neonates. Only 9.2% of the respondents had medical illness before pregnancy. Mothers 14.7% had pregnancy-associated illness. This findings is inconsistent with the findings that 53% mothers had significant illness during their pregnancy delivered LBW babies.[14]

The present finding shows association between mothers' socio-demographic variables age, religion, residence, educational status occupation, socio-economic status, family type, type of diet and consanguineous marriage and low birth weight neonates. There is no statistically significant association between mothers' socio demographic variables and low birth weight neonates. This finding is inconsistent with the findings that the factors associate with LBW included age, education, family members, gravida and antenatal care. And consistent with the following variables were found insignificant: religion, residence, occupation, family type, birth to conception interval, still birth, abortion, death of previous children, total antenatal visit and gestational age at first ANC visit.[14]

The finding shows association between mothers' basic information during pregnancy and low birth neonates. There is statistically significant association between food taboos (p=0.054) and alcohol (p=0.002) during pregnancy and low birth weight neonates. There is no statistically significant association between increases amount and number of food, rest during day and night time, smoking and anemia with low birth weight neonates. This study is inconsistent with the findings done by Girma et al that dietary modification, alcohol, anemia and low birth weight.[16] This may be the difference between two countries that the practices followed during pregnancy may be varies.

The finding shows that there is statistically significant association between mode of delivery (p=0.021), ANC visit (p= 0.037), iron supplement (p=0.010), calcium (p=0.048) and low birth weight neonates. There is statistically no significant association between pregnancy type, parity, folic acid supplement, albendazole, history of abortion, complication during pregnancy, medical illness and pregnancy associated illness and low birth weight neonates. In the study done by Mehare T, Sharew Y (2020)[17] showed that pregnancy type, ANC follow-up were significantly and assertively associated with low birth weight.

CONCLUSION

On the basis of study findings, it is concluded that the prevalence of low birth weight was 28.5% found and it was associated with weeks of gestation, food taboos, alcohol consumption, neonates mode of delivery, ANC visit, iron and calcium supplement, food taboos. Others findings sex of baby, IUGR, any abnormality, socio-demographic variables (age, residence, educational status, occupation), dietary history, rest, alcohol, hemoglobin for anemia, type of pregnancy, parity, mode of delivery, ANC follow up, supplementation during pregnancy, history of abortion, low birth weight, any complication during pregnancy, illness before and during pregnancy tends to influence the low birth weight babies.

LIMITATIONS

The study was conducted in a single hospital of Bhairahawa, and excluded the twins delivered neonates. So, findings of the study cannot be generalized in other setting.

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