Evaluation of Factors of Low Birth Weight Deliveries: A Cross Sectional Study

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ABSTRACT

Background: Low birth weight is the most serious challenge for infant survival, healthy growth and development. It is the major determinant of the infant morbidity, mortality and disability in childhood. Different maternal and newborn factors contribute to Low birth weight. Hence, this study aims to assess the factors of low birth weight among deliveries at a tertiary hospital.

Methods: A cross sectional analytical study was conducted among 203 postnatal mothers who had delivered low birth weight babies in Patan hospital from 1st September to 30th November 2019.Purposive sampling technique was used to select the sample for the study. Interview was conducted using a self-structured questionnaire. Data were analyzed with SPSS version 20 using descriptive and independent sample t-test to identify factors of Low birth weight.

Results: Increased amount of dietary intake, consumption of folic acid tablet, iron and folic acid tablet ($p<0.01$,CI:95%), calcium tablet($p<0.05$) and hypertension during pregnancy($p<0.01$) can make significant differences in the mean birth weight of the baby. Similar difference was observed with the sex of baby ($p=0.05$)and gestational age at birth($p<0.01$).

Conclusions: Less dietary intake and micronutrients supplements are largely responsible for the Low birth weight. Possible maternal factors can be eliminated in order to reduce Low birth weight deliveries. Therefore, emphasis should be given on these factors while providing antenatal care via health teaching and counseling to mothers.

Keywords: Factors of low birth weight; postnatal mothers; tertiary hospital.

INTRODUCTION

Birth weight of newborn is the single most important determinant of neonatal and infant probability of survival, healthy growth and development.[1] Low birth weight (LBW) is defined as weight at birth of less than 2500 grams irrespective of the gestational age.[2] LBW babies have 20 times greater chance of mortality than the other normal birth weight babies.It possess serious threats to maternal and child health.[1]Approximately 20 million LBW babies are born each year globally and 96.5% of them happens in developing countries.[3] The prevalence of LBW is highest in South Asia and it is 11.9% in Nepal.[4]

Factors such as time of first antenatal care (ANC) visit, number of ANC visits, iron, calcium supplementation, maternal education, illness during pregnancy, maternal height, dietary intake, rest and period of gestation are responsible for factors of LBW.[5,6] This study assessed the factors responsible for low birth weight among deliveries at a tertiary hospital.

METHODS

A cross-sectional descriptive study was conducted among postnatal mothersin Post-Partum Ward, Birthing Center, Gynae Ward and Private Ward of Patan Hospital from January 2019 to February 2020 to assess the factors of low birth weight.

Non- probability purposive sampling was used for the selection of samples. By taking confidence interval of 95% and permissible error of 0.05 and "p" as 0.15 the estimated sample size was196. However, the actual sample size of this study was 203.Postnatal mothers who delivered LBW babies in Patan Hospital and willing to participate were included after taking informed written consent. LBW with

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twin deliveries were excluded. The data were collected within 24hours of vaginal delivery and collected after 24hours of post caesarian section. Face to face interview using semi structured questionnaire was conducted for data collection. To assess factors of low birth weight among deliveries 17 maternal related questions, 3 items on maternal comorbities and 3 newborn related questions were included in the instrument. In the part of maternal related factors more amount of dietary intake during pregnancy than before, type of food consumed, consumption of folic acid tablet in the first three month of pregnancy and Iron and Foilic Acid (IFA) and calcium tablet from fourth month of pregnancy till delivery and rest and sleep during pregnancy were assessed. The mother's chart was also reviewed for hemoglobin, recorded hypertension, diabetes, gestational week, birth weight and sex of the baby for analysis.

Data were coded, entered and analyzed using SPSS version 20. Descriptive statistics i.e. frequency, percentage, mean and standard deviation and Inferential statistics i.e. independent sample t-test was used to analyze the factors of low birth weight.

Ethical approval was obtained from Institutional Review Committee (IRC), Patan Academy of Health Sciences (PAHS) prior to study. Each respondent was explained about the objective of the study and informed written consent was obtained before interview. The confidentiality was maintained by using the code number and not revealing their individual identity in report findings.

RESULTS

Table 1. Information of respondents related to maternal factors (n=203).

Characteristics	Frequency (N)	Percentage (%)
Age groups		
<20 years	8	3.9
20- 29 years	134	66.0
≥ 30 years	61	30.1
Mean age in years ±SD	27.7 ±4.6	
Education		
No formal education	6	2.9
Primary education	32	15.7
Secondary education	24	11.8
More than secondary	141	69.4
Parity		
Primipara	118	58.2
Multipara	85	41.8

Table 2. Comparison of Mean Birth Weight with Maternal Factors: Age, Education, Parity; Birth Interval and Birth weight of previous baby (n=203).

Characteristics	n (%)	Mean birth weight ±SD(gm)	t value	p value
Age Groups				
< 30 years	142 (70)	2115±410	0.68	0.48
≥30years	61 (30)	2071±436		
Educational status				
Illiterate	6 (3)	1787 ± 647	-1.22	0.27
Literate	197 (97)	2111 ± 407		
Parity				
Primipara	118(58.2)	2076±434	-1.03	0.30
Multipara	85(41.8)	2137±39		
Birth interval (n=85)				
< 24months	9(10.6)	2117±488	-0.10	0.92
≥ 24months	76 (89.4)	2132±398		
Birth weight of previous baby(n=85)				
<2500gm	32(37.6)	2181±332	0.96	0.33
≥ 2500gm	53(62.4)	2099± 499		

p value <0.05

Factors like maternal age, education, parity,birth interval and birth weight of previous baby did not make any significant difference in birth weight of the baby. (Table 2)

Table 3. Comparison of mean birth weight with maternal factors (n=203).

Characteristics	N (%)	Mean birth weight ±SD (gm)	t value	p value
More amount of dietary intake			3.27	0.00**
Yes	182(89.6)	2142±385		
No	21(10.4)	1755±524		
Type of food consumed			1.20	0.23
Vegetarian	83(40.8)	2142±359		
Non-vegetarian	120(59.2)	2074±452		
Consumption of Folic Acid Tablet in first three months of pregnancy				
Yes	176(86.7)	2143±386	3.02	0.00**
No	27(13.3)	1833±511		
Consumption of Iron and Folic Acid (IFA) tablet from fourth month of pregnancy				
Yes	201(99.0)	2111± 408	3.25	0.00**
No	2(1.0)	1167±237		

Consumption of Calcium tablet from fourth month of pregnancy Yes No	195(96.1) 8(3.9)	2125±393 1523±590	2.86	0.02*
Duration of Sleep at night <8hours ≥8 hours	40(19.7) 163(80.3)	2058±408 2112±407	-0.74	0.45
Rest during day time <2hours ≥ 2hours	47(23.2) 156(76.8)	2069±452 2112±407	-0.61	0.53

The mean birth weight of the deliveries of the mothers who consumed increased diets during pregnancy, consumed folic acid, calcium, and IFA tablet are significantly higher (p<0.01, CI:95). However, the mean differences of birth weight with the maternal factors i.e. type of food consumed, duration of sleep at night and rest taken during day time were not statistically significant (p>0.05) (Table 3).

Table 4. Comparison of mean birth weight with maternal comorbidities (n=203).

Characteristics	N (%)	Mean birth weight ± SD(gm)	t value	p value
Anemia During Pregnancy Yes (< 11gm/dl) No (≥ 11gm/dl)	24(11.8) 179(88.2)	1902±531 2128±394	-2.01	0.054
Hypertension During Pregnancy Yes No	21(10.3) 182(89.7)	1723±496 2145±385	-3.77	0.001*
Diabetes During Pregnancy Yes No	5(2.5) 198(97.5)	2152±218 2100±421	0.27	0.78

** p value <0.01*

Hypertension during pregnancy had less mean birth weight (1723±496gm) than the respondents who did not have hypertension (2145±385gm) which was statistically highly significant (p=0.001). However the mean difference of birth weight with or without anemia and diabetes had no statistical significance (table 4).

Table 5. Comparison of mean birth weight with newborn related factors (n=203).

Characteristics	N (%)	Mean birth weight ± SD (gm)	t value	p value
Sex of Baby Male Female	108(53.2) 95(46.8)	2048±429 2163±396	-1.97	0.05*
Gestational Age at Birth<37 weeks ≥ 37weeks	106(52.2) 97(47.8)	1907±473 2314±184	-8.21	0.00**

**p value <0.05, ** p value <0.01*

Male newborn baby (53.2%) had less mean birth weight (2048±429gm) than female newborn baby and is statistically significant (p=0.05) (Table 5).

DISCUSSION

This study assesses the factors of low birth weight among deliveries. 15.5 % births are low birth weight globally and 96.5% are in developing countries.[3] Prevalence of LBW ranges from 9% to 35.1% in developing countries[7] and accounts 11.3% in Nepal.[4]During this study period there were 2111 deliveries occurred in Patan Hospital. Out of them, 274 (12.97%) were LBW which is higher than the national prevalence[4] and the prevalence of previous retrospective study (11.99%)[8] of Patan hospital. Higher proportion of referral (29.1%) may be the reason for increased prevalence of LBW at this tertiary hospital.

Different factors such as maternal age, multiple pregnancy,[7] sex of the baby,[9] nutrition of mother during pregnancy orcomorbidities.[2, 5] has significant role to play in the weight of the new born. The present study showed that there was significant difference between more amount of dietary intake during pregnancy and mean low birth weight (p=0.00, 95%CI). The similar study by Bansal in 2019 revealed that dietary intake of less than or same as before during pregnancy has three times higher chance of low birth weight(OR=3.441, with 95% CI 1.59 -7.40) as compared to dietary intake more than before. That study also showed dietary intake as a factor of LBW (p <0.05).[6] Study conducted in 4 selected hospitals of Nepal which showed that the mothers with food intake less than two times per day had risk of two fold increase (OR=2, 95%CI=1.4-2.9) in low birth weight deliveries (p=0.006).[10]

The present study showed there was significant difference in mean value of LBW between mothers taking folic acid tablet and mothers not taking folic acid during first three months of pregnancy (p= 0.00). A study conducted in 42 counties of Western China showed that the chances of having low birth weight was 1.32 times higher in mother who did not take folic acid during pregnancy (AOR: 1.32, 95% CI 1.00-1.74) than the mother who had taken folic acid tablet.[11] Similar result showed by the study conducted in China revealed that the folic acid protects the infants from LBW.[12]

The result of this study showed that the chances of having low mean birth is high when the mothers had not consumed the IFA tablets which is comparable with the study conducted in India where mothers who had taken IFA tablets more than 100 days had less LBW(9.9%) babies than mothers who had taken IFA tablets less than 100 days(21%) (p<0.001).[9] Study from Eastern Nepal also showed that inadequate intake of the IFA tablets can increase the risk of low birth weight by three times (n=318, OR =3.21,95%CI:1.72-5.99).[6] However a similar study from TU teaching hospital failed to show any association between IFA tablet intake and low birth weight.[13]

The present study showed that the mothers without calcium supplement tablets have less mean birth weight of the baby than the mothers who had consumed it. Similar result was shown by the study conducted in Eastern Nepal that the mothers without calcium supplement were three times more likely to have LBW babies (OR=3.57). The calcium supplement was found to be significantly associated with LBW (p<0.02).[5] However community based cross sectional survey conducted among 42 counties in China showed that chances of having LBW was equal whether the mother consume supplemental calcium or not (AOR: 1.00, 95% CI).[11]

The present study showed that the mother who had hypertension had more LBW babies (p=0.001). Mother having hypertension during pregnancy were 4times more likely to deliver LBW babies than normotensive mothers (OR: 4.25, 95% CI: 1.17-15.35; p=0.002).[5] Case control study from Brazil mentioned that the clinical characteristics such as maternal hypertension, anemia and gestational diabetes had more chances of low birth weight(OR:1.6, 1.2 and 1.5 respectively).[14] The study conducted by Momeni in 2017 mentioned that LBW among Iranian mothers had significant association with hypertension but not with diabetes and anemia.[15] A retrospective study failed to reveal any significant association between maternal comorbidities (anemia, hypertension and diabetes) with low birth weight (p>0.05).[8]

The present study result explored that the male newborns have less mean birth weight compared to female newborn. Multiple studies mentioned about the association of female sex and low birth weight of the baby.[9,16,17] Though the female new born were more likely to be have low birth weight but the difference in mean weight was not significant (p=0.89).[18]

The gestational age with cutoff at 37 weeks had significant birth weight difference in this study. Studies mostly from developing countries found gestational age at birth as a significant factor of low birth weight.[7,19-22] However the study conducted in India didn't showed the significant association between low birth weight and gestational age of newborn (n=100, p>0.05).[23] The findings may be due to only less number of babies (10%) have less gestational age (<37weeks) in that study.

The present study is limited to single center and only observational study was done.

CONCLUSIONS

Factors such as amount of food intake during pregnancy, consumption of folic acid tablet in first three months of pregnancy, Iron and Folic Acid (IFA) supplement tablet, calcium supplement tablet from fourth month of pregnancy, hypertension during pregnancy, sex of the baby and gestational age at birth were found to have significant association with birth weight.

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Competing interests: None declared

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