Maternal and Neonatal Risk Factors of Low Birth Weight in Guwahati metro, Assam, Northeast India.

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Abstract:

INTRODUCTION AND OBJECTIVES: Birth weight is an important determinant of child survival and development. Low birth weight is an index of our status of public health, maternal health and nutrition. The major challenge in the field of public health is to identify the factors influencing low birth weight and to institute remedial measures. The study was attempted to assess prevalence of low birth weight and its risk factors affecting low birth weight was conducted among 300 mothers and their respective live born baby in GMCH, Guwahati metro, Assam.

MATERIALS AND METHODS: A cross sectional study design was carried out in a government hospital among 300mothers using interviewer administered questionnaire. All 300 postnatal mothers who delivered in the hospital during study period were included in the study except still births. All babies were weighted on standard beam balance within 24 hours of delivery and mother's height was measured by height measuring stand. **Bivariate and multivariate logistic regression** was employed to identify the predictors at $p<0.001$ and $p<0.05$.

RESULTS AND ANALYSIS: The prevalence of low birth weight was found as 26.0% (95%, CL=21.36-31.24) in 300 samples. 50% of LBW was found in the age group of mothers <18 yrs. Low birth weight was significantly risk with maternal age <18years (OR=3.06* 95%Cl=1.24-3.52), height of the mother <145cm (OR=2.72* 95%CL=1.61-4.62), history of ANC visit <3(OR=1.90* 95% Cl=1.03-3.52), multiple pregnancy (OR=5.95* 95% Cl=1.07-33.13), gestational age <37weeks (OR=10.00*885 95% Cl=4.53-22.09), . Female child (OR=1.02, 95% Cl=0.61-1.72) and preterm birth (OR=10.00, 95%Cl=4.53-22.09), weight gain during pregnancy <6 kg (OR=1.98 95%Cl=0.88-4.44), history of high risk behavior(use of tobacco) (OR=8.84 95%Cl=0.91-86.28), iron and folic acid consumption(*OR=1.44, 95%CI: 0.35-5.90*), status of previous birth (*OR=2.73, 95%CI: 0.81-9.14*), were found to be higher risk of LBW.

DISCUSSION AND CONCLUSION: The prevalence of low birth weight was found to be very high and it was associated with many risk factors related to maternal health and services. Hence it is recommended to improve maternal health through strengthening the existing maternal services at the basic level of community.

Keywords: Low birth weight, Maternal age, Parity, ANC visit, HB% level, Gestational age, High risk behavior, GMCH.

INTRODUCTION

Birth weight is an important determinant of child survival and also growth and development. Low birth weight is a major public health problem in developing countries including in India. Low birth weight has been defined by WHO as birth weight of less than 2500 gm. (WHO 1984)[1] Low birth weight (LBW) deliveries contribute to

high neonatal mortality rates (NMR) in developing countries. Several maternal risk factors are associated with LBW newborns.[2]

The prevalence of LBW in any population reflects its socio-economic development and status of public health. It is an indicator of future health and survival of child. The NFHS 3 reports association of LBW to place of residence (urban or rural), age of mother, religion and caste, birth order of the baby, education, wealth and use of tobacco.[3]

LBW contributes to 60%-80% of all neonatal death. The global prevalence of LBW is 15.5% which amount to about 20 millions LBW born each year, 95.5% of them in developing counties.[4] India is one of the countries with the highest incidence of LBW, which has nearly 7.5 millions LBW babies anually.[5] According to UNICEF estimate, almost every third newborn (30%) in India is LBW.[6] Perinatal mortality among LBW infants is about eight times higher than that in infants weighing more than 2.5kg.[7] LBW is not only major predictor of prenatal mortality and morbidity, but recent studies have found that LBW also increases risk for non-communicable diseases such as diabetes and cardiovascular disease later in life.[8,9] LBW can affect nearly all organs in the body. They may have problems with their lungs, intestinal tract, vision and hearing, and future developmental delays.[10] Chronic health conditions that may lead to LBW include high blood pressure, diabetes and heart, lung and kidney problems.[11]

The primary cause of LBW is premature birth, being born before 37 weeks of gestation; and another cause of low birth weight is intrauterine growth retardation. However, there are other factors that can also contribute to the risk of low birth weight. These includes: race, mother's age, multiple birth, mother's health, low socio-economic status. [12]

The best way of prevention of LBW is prevention of preterm births. Prenatal care is a key factor in preventing preterm births and LBW babies. Maternal health like proper nutrition and weight gain are linked with fetal weight gain and birth weight. Mother should avoid alcohol, cigarettes and illicit drugs, which can contribute to poor fetal growth, among other complications.

MATERIALS AND METHODS

A cross sectional study design was carried out in a tertiary care hospital, Guwahati Medical College Hospital (GMCH), Assam in 2016 from October to December. The study was conducted in the post-natal ward among 300 mothers delivering live born neonates in the hospital. The sample size 300 was calculated taking minimum 25% prevalence of low birth weight with 20% of permissible error. Consecutive non-random sampling technique was used for selecting samples. Ethical permission was obtained from the hospital authority and verbal consent was taken from each sample. The babies were weighed on standard beam weighing machine up to 20 gm accuracy within 24 hours of the birth. LBW was defined as a birth weight of <2500 gm. Mother's height was measured up to the accuracy of 0.5 cm by height measuring stand. A predesigned and pretested structured interview schedule related to socio-demographic variables and the maternal risks factors of LBW among post-natal mothers were used for collecting information. The mothers whose were critically ill at the time of data collection and whose mothers had still birth baby were excluded from the study sample. The data collected was compiled, tabulated and subjected to statistical analysis wherever applicable. Statistical analysis was done using SPSS for windows, version 18.0. Bivariate and multivariate logistic regression was employed to identify the predictors at $P<0.001$, and $p<0.05$.

RESULTS AND DISCUSSION

The prevalence of LBW in GMCH, Guwahati metro during the study period was 78 out of 300 cases corresponding to estimated prevalence 26% (95% CI: 21.36%-31.24%). The normal baby was 74% (95% CI: 68.76%-78.64%). (**Fig-I**) The prevalence of low birth weight in the present study was 26.00% (95% CI: 21.36%-31.24%) whereas overall, it is estimated 15% to 20% of all births worldwide are LBW. A similar prevalence (27.2%) was reported by UNICEF global data base 2012 in Bihar.[13] Several supportive studies conducted in different part of the Assam reported 28.40% by M Krishnatreyal et al.[14], 21.8% by M Bora.[15] 14.22% by Baruah(2002)[16] and also reported the higher prevalence of low birth weight (31.3%) in west Bengal.[17]40.0% in Uttar Pradesh.[18]

From total participants, 81.00% of mothers from rural and 19.00% from urban. In regards of mother's educational status, 51.67% of mothers were literate, 48.33% were illiterate. As a indicator of socio-economic status, majority of respondents (47.33%) had monthly income were Rs. 5001-10,000.

The prevalence of LBW 50% in the age group of <18 years, 25% in the age group of 18-34 years and 10% at the age group of above 35 years.(**Fig:2**) It is observed that the age of the mother affected the rate of LBW considerably. Incidence rate is highest among the younger mothers. This finding supported by Rahul et al,[19] Velankar DH[20] and Anand et al.[21]Agarwal et. al.[22]

The relationship between maternal factors and LBW was showed in the following (**Table-3**). The relative risk of LBW was more than thrice as high among < 18 yrs than among ≥ 18 yrs. The odds ratio was 3.06* *(95% CI :1.24 - 3.52)* and the 95% CI for the relative risk ratio does not include 1, indicating that there is a significant difference in the occurrence of LBW between < 18 Yrs and ≥ 18 Yrs. In a previous study by Anand et al., it was found that maternal age is an independent risk factor of LBW (*OR=2.03, 95% Cl 1.14 to 3.60)*[21]

An analysis of variance showed that the effect of birth weight of newborn was insignificant on Hb% level of mother during delivery, $F(1,298) = 0.814$, $P = 0.368$. In other words, mother of low birth weight of newborn (*M*=10.23, *SD*=1.52, Range: 6.70-14.20) had same Hb% level of mothers with normal birth weight of newborn, (*M*=10.41, *SD*=1.50, Range: 5.10-14.90), $t(298)=0.903$, $P = 0.368$(two tailed). It seems that overall Hb% level of mothers both with LBW of newborn and with normal birth weight of newborn is very low.(**Table-1**) A study by Kavitha B et al, reported that about 35.28% of mothers with low birth weight HB% level was 10.9% and it was about two-third of the mothers were anemic.[23] another studies also reported similar findings.[24-26] Maternal hemoglobin is an indirect indicator of overall maternal nutrition and therefore, low maternal hemoglobin can identify undernourished mothers whose fetus may suffer ill effects of malnutrition.

Birth interval having <2 had higher OR than that of ≥ 3 (*OR=1.88, 95%CI: 1.24-3.52*), Similarly, Primipara Parity had higher OR than that of multipara (*OR=1.64, 95%CI: 0.96-2.81*). Similar interpretation was found in case of height of the mother. Risk of LBW was more than two times as high among mothers <145 cm height than among the mothers >145 cm height (*OR=2.72*, 95%CI: 1.61-4.62*). This finding is consistent by several studies (Deshmukh et al.,[24] Ghosh et al.,[27] Kiran A,[28] and Mumbare et al.[29] Tellapragada et al.[30] where maternal height was an independent risk factor of LBW.

Regarding history of ANC visit, mothers those were attended <4 ANC visit was found as higher risk of LBW(*OR=1.90*, 95%CI: 1.03-3.52*), Similar finding was revealed by the studies conducted in Preeti H et al.[31], and Mumbare et al.[29] This may lead to inadequate antenatal care which influencing to LBW. Type of pregnancy (*OR=5.95*, 95%CI: 1.07-33.13*) also were significant risk factor of LBW where multiple pregnancy was more than 5 times higher than single pregnancy. This study was supported by Duhlui et al. in Nijeria (aOR 5.11; 95% CI [3.11–8.39]), where twin pregnancy 5 times more likely to deliver a LBW.[32]

Although, no significant risk of LBW was found in history of abortion (*OR=1.15 , 95%CI: 0.57-2.31*), history of chronic diseases (*OR=1.57, 95%CI: 0.27-9.04*), iron and calcium consumption (*OR=1.44, 95%CI: 0.35-5.90*), weight gain during delivery (*OR=1.98, 95%CI: 0.88-4.44*), history of high risk behaviour (O*R= 8.84, 95%CI: 0.91-86.28*), status of previous birth (*OR=2.73, 95%CI: 0.81-9.14*), but findings revealed the higher odd ratio. (**Table-4**)

In case of neonatal risk factors, female child had higher risk of LBW than that of male child (OR=1.02, 95%CI: 0.61-1.72), Similar finding reported by Manna et al. where female LBW babies were significantly (p=0.04) more (34.7%) than their male counterpart (26.7**%).[33]**

In the present study, mothers < 37 weeks of Gestational age at birth were found to be significant risk to LBW than that of ≥ 37 weeks (OR=10.00*, 95%CI: 4.53-22.09). This finding was consistent by a study in Tamilnadu[34] where preterm birth was a significant risk factor of LBW. And present study also showed that no congenital malformation present with higher risk (OR=2.14 , 95%CI: 0.25-18.05).
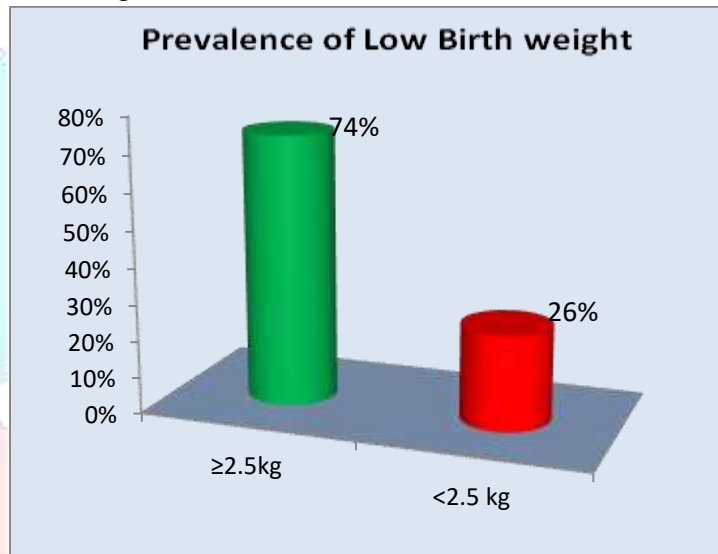

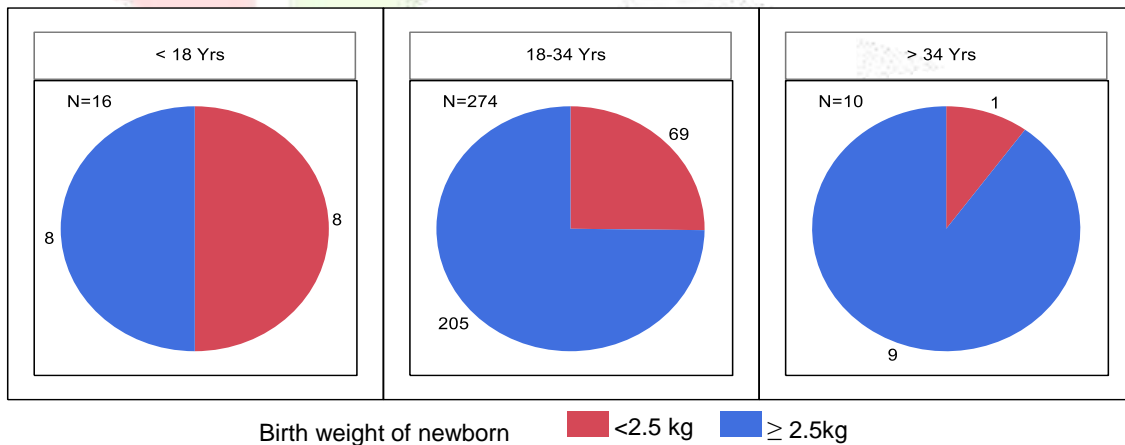**Fig 1: Histogram showing prevalence of Low Birth Weight baby**

Fig 2: Pie diagram showing prevalence of LBW baby according to age of the mother

Table 1: (ANOVA Table) Hb% level during delivery with respect to birth weight of newborn

	Sum of Squares	df	Mean Square	F	*P*-value
Between Groups	1.844	1	1.844	0.814	0.368
Within Groups	674.924	298	2.265		
Total	676.768	299			

Table 2: **Risk Estimates and Odd Ratios Analysis in maternal risk factors for LBW**

Maternal risk factors		Odd of outcome for LBW	OR	95%CI	
				Lower	Upper
Maternal age	< 18 Yrs	1.00	3.06*	1.24	3.52
	≥ 18 Yrs	0.33			
Birth interval	< 2	0.42	1.88	0.72	4.94
	≥ 3	0.22			
Parity	Primipara	0.43	1.64	0.96	2.81
	Multipara	0.26			
Height of the mother	< 145 cm	0.62	2.72*	1.61	4.62
	≥ 145 cm	0.23			
History of abortion	Yes	0.39	1.15	0.57	2.31
	No	0.34			
History of chronic diseases	Gestational hypertension	0.63	1.57	0.27	9.04
	Gestational diabetes	0.40			
History of ANC visit	< 4	0.58	1.90*	1.03	3.52
	≥ 4	0.31			
Iron and calcium consumption	No	0.50	1.44	0.35	5.90
	Yes	0.35			
Weight gain during delivery	< 6	0.65	1.98	0.88	4.44
	≥ 6	0.33			
History of high risk behaviour	Tobacco	3.00	8.84	0.91	86.28
	None	0.34			
Status of previous birth	LBW	0.63	2.73	0.81	9.14
	Normal	0.23			
Type of pregnancy	Multiple	2.00	5.95*	1.07	33.13
	Single	0.34			

* Significant at P(<.05)

Table 3: Relative Risk Estimates and Odd Ratios Analysis in Neonatal risk factors for LBW

Neonatal risk factors		Odd of outcome for LBW	OR	95%CI	
				Lower	Upper
Sex	Female	0.36	1.02	0.61	1.72
	Male	0.35			
Gestational age at birth	< 37weeks	2.50	10.00*	4.53	22.09
	≥ 37weeks	0.25			
Any congenital malformation present	No	0.36	2.14	0.25	18.05
	Yes	0.17			
Total					

* significant at P(<.05)

CONCLUSION

Globally, more than 20 million infants are born with LBW. The major challenge in the field of public health is to identify the factors influencing LBW and to institute remedial measures. The study was attempted to assess prevalence of LBW and its risk factors affecting LBW.

The prevalence of LBW was found to be very high and it was associated with many risk factors related to maternal health and services. Among these, LBW was significantly associated with maternal age <18years (p<0.045*), height of the mother <145cm (< .001**), history of ANC visit <3 (p<0.038*), history of high risk behavior (use of Tobacco) (p<0.024*), multiple pregnancy (0.022*), gestational age <37weeks (p< .001**), normal mode of delivery (p<0.005**).

Hence it is recommended to improve maternal health through strengthening the existing maternal services such as maternal nutrition, and education, at the basic level of community.

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