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Prevalence and Determinants of Low Birth Weight in Bhopal City

KEYWORDS: Low birth weight, prevalence, determinants, Central India

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ABSTRACT *Background: Low birth weight is directly responsible for a considerable proportion of neonatal mortality and morbidities. We carried out this study with the aim to assess the prevalence and determinants of low birth weight in study area. Material and Methods: A facility-based cross-sectional study was conducted involving 792 pregnant women, at 4 hospitals of Bhopal city from October 2015 to May 2016. Non probability purposive sampling was used to recruit study participants. Socio-demographic, medical and obstetric data of the study participants were collected using structured questionnaire. Results: Overall, prevalence of low birth weight was 32.6 %. Pre-term delivery, history of pre-eclampsia, tobacco consumption during pregnancy, severe anemia and labor intensive occupation were strong determinants of low birth weight among study participants. Conclusions: The role of family members is important in ensuring the proper antenatal care and fulfilling the nutritional needs of the pregnant mothers along with supporting her in day to day activities.*

INTRODUCTION:

Low birth weight is defined by the World Health Organization (WHO) as birth weight less than 2.5 Kilograms (5.5 pound).[1] It is estimated that 15% to 20% of all births worldwide are low birth weight, which translates to about 20 million births each year.[2] Therefore, globally a goal to reduce the number of low birth weight newborns by 30 % by the year 2025 has been set up by leading health agencies.[2] There is considerable variation in the prevalence of low birth weight across regions and within countries; however, the most of low-birth-weight births occur in low- and middle-income countries and especially in the low socio economic populations.[2]

Low birth weight continues to be a significant public health problem globally and is associated with a range of both short- and long term consequences. The consequences of low birth weight include neonatal mortality and morbidity, poor cognitive development and an increased risk of chronic diseases in later life.[3,4] Low birth weight is complex entity; which includes preterm neonates (born before 37 weeks of gestation), small for gestational age neonates at term and the overlap between these two situations.[5] There are multiple causes of low birth weight, including early induction of labor or caesarean birth (for medical or non-medical reasons), multiple pregnancies, infections and chronic conditions such as high blood pressure.[6-8] Reducing the incidence of low birth weight requires a comprehensive global strategy, which must include multiple elements: such as improving maternal nutritional status; treating pregnancy associated conditions such as pre-eclampsia; and providing adequate maternal care, perinatal clinical services and social support. The present study was carried out with the objective to estimate the prevalence of LBW and its determinant in study area.

MATERIAL and METHODS:

Study Setting and Design. This was a hospital based quantitative cross-sectional study. The present study was conducted at 1 government and 3 private hospitals of Bhopal, the capital of state of Madhya Pradesh, India. The total duration of study was eight months (October 2015 to May 2016). The period of data collection was six months (November 2015 to April 2015). *Study Population:* All pregnant women who delivered babies at the selected health facilities of Bhopal. *Sample Size:* Sample size was calculated based on the single population proportion formula using $\mathbf{Z2 \times p \times q / d2}$ with a 95% CI, 5% margin of error, and an assumption that 37.0 % of all babies born in Bhopal have low birth weight in the study area.[9] Assuming a 10% nonresponse rate and a design effect of 1.5, a total sample size of 590 pregnant women was arrived at. But we included all the women coming for delivery at the selected hospitals during the period of study who gave valid informed consent for study. Following this 792 pregnant women were included in the study. *Selection criteria*: All women coming for labor/delivery at selected health facilities and who gave written consent were enrolled in study. *Exclusion criteria:* (i) Pregnant women who had twin pregnancy (ii) Pregnant women having gestational diabetes mellitus (iii) Pregnant women having HIV (iv) Pregnant women who delivered a child with congenital malformations were excluded from the study. *Data Collection:* Data was collected using pretested questionnaire, which obtained information on sociodemographic characteristics (age, education, occupation, marital status, and others), obstetric, gynecological, medical history and dietary factors. The questionnaire was pilot tested on a sample of 30 women who delivered at district hospital Bhopal. Thereafter questionnaire was modified. The results of pilot test were excluded from final data analysis. Data was collected during the postpartum stay of mother at health facilities. Birth weight of newborn was measured using electronic weighing machine. All babies were weighed within 1 hour of birth. Mother's height was measured up to the accuracy of 0.1cm by height measuring stand and weight was recorded with minimal clothing on spring balance weighing machine up to the accuracy of 0.1 kg. Hemoglobin level 11 g% was taken as cut-off point for anemia among mothers in par with the WHO criteria.[10] Standardization of equipment was done to minimize error and observers were trained to prevent inter-observer variabilities in recordings. World Health Organization (WHO) definition and classification for birth weight was used to classify newborn for the purpose of study.[1] *Outcome variable:* The chief outcome

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variable was the prevalence of low birth weight among the new born. *Independent variable:* Maternal factors (height, weight, age, parity, hemoglobin % level, education, occupation, co-morbid condition, antenatal history) and social factors (type of family, religion, caste, socioeconomic status, domestic violence during pregnancy, housing, access to aganwadi). *Statistical analysis:* Data were checked for accuracy and completeness. Incomplete questionnaire were not included in the final analysis. Data were analyzed using SPSS version 20.0. Categorical variables were summarized as numbers and percentages, whereas normally distributed continuous variables were presented as means and standard deviations. To identify factors associated with the outcome variable (severe anemia), first a bivariate logistic regression analysis was performed for each independent variable and crude odds ratio (COR) with 95% confidence intervals was obtained. Then, significant variables observed in the bivariate logistic regression analysis (value < 0.05) were subsequently included in the multivariable logistic regression model to determine independent predictors for the outcome variable among the pregnant women. The strength of statistical association was measured by crude and adjusted odds ratios and 95%confidence intervals. Confidentiality of information was maintained throughout the procedure.

RESULTS:

A total of 920 women had their labor conducted at the selected sites during the period of study, 87 women/new born have to be referred to higher centers for appropriate treatment, 25 women refused to participate in the study and 16 women didn't complete the questionnaire. Thus final data analysis was done on a total of 792 pregnant women. The overall prevalence of low birth weight among study participants was 32.6 % whereas 1.1 % of newborn had high birth weight. Of the all low birth 76.4 % weighted between 2.499 kg - 1.5 kg, 20.2 % were very low birth weight (1.0 kg – 1.499 kg) and rest 3.4 % were extremely low birth weight (< 1.0 kg).

About table 1 here:

Socio-demographic profile of the study participants is presented in Table 1. The age of study participants ranged from 18 to 34 year. The mean age of mothers who delivered low birth weight baby was low as compared to those who delivered a normal weight baby (not shown in table).

About table 2 here:

Table 2 details the obstetric and medical history of study participants.

About table 3 here: Preterm delivery (AOR(CI) = 4.45 (1.23- 6.19)) hard physical work during pregnancy (AOR (CI) = 3.46 (1.39-5.27)), mothers with severe anemia (AOR (CI) = 1.80 (0.75-2.58)), incidence of pre-eclampsia and hypertension during delivery (AOR (CI) = 3.96 (1.59-5.27)) and consumption of tobacco during pregnancy (AOR (CI) = 2.68 (1.08- 3.94)) were the strong determinants of LBW in multivariate analysis.

Discussion:

In this study we found that pre-term delivery was very strongly associated with LBW in babies. A studies by Singh et al and other researchers in Ahemdabad, India also reported similar findings.[11,12]

We observed that hard physical work during pregnancy was strongly associated with LBW. A higher proportion of LBW babies were born to mothers who had done hard physical work during present pregnancy. Agarwal et al also showed similar relationship between physical work of mother and LBW .[13] Some other researchers have also reported that lifting heavy loads during pregnancy has been shown to be one of the risk factors for low birth weight. [14,15] These findings can have severe consequences in countries such as ours as such mothers doing hard physical labors are particularly undernourished women. History of tobacco consumption was also strongly associated with the low birth weight. This is an important finding as many Indian women especially from lower socio economic status chew tobacco. Severe anemia at the time of delivery and low consumption of Iron folic acid during the pregnancy was also associated with low birth weight.[16]

Conclusion:

Preterm delivery, hard physical work during pregnancy, mother's lower hemoglobin level and consumption of tobacco in any form were the major determinants of low birth weight among babies in our study. Government run public health programs should strengthen the delivery of services at the door step of women. Every women especially migrant labors women should be traced so as to provide complete antenatal care during all the three trimester of the pregnancy.

Provision of a more intensive ANC to mothers with a history of premature deliveries can be another important strategy to prevent low birth weight babies. The role of family members is important especially in fulfilling the nutritional and health care needs of the pregnant mothers.

Table 1: Distribution of study participants by socio-demographic characteristics (n=792)

Variable	Birth Weight		
Low (< 2.5 Kg) n=258(%)	Normal (2.5 – 4.0 Kg) n=525(%)	High (> 4 Kg) n=9(%)	
Age			
< 20	59 (22.9)	72 (13.7)	0()
20-25	99 (38.4)	188 (35.8)	1(11.1)
26-30	68 (26.4)	149 (28.4)	3(33.3)
30 and more	32 (12.4)	116 (22.1)	5(55.6)
Education			
Illiterate	49 (19.0)	105 (20.0)	()
School educated	102 (39.5)	142 (27.0)	5(55.6)
College educated	107 (41.5)	278 (53..0)	4(44.4)
Residence			
Slum-Urban	105 (40.7)	303 (57.8)	(0.0)
Non Slum-urban	129 (50.0)	179 (34.1)	8(88.9)
Rural	24 (9.3)	43 (8.2)	1(1.1)
Family size			
3	42 (16.3)	143 (55.4)	3(33.3)
4	167 (64.7)	209 (39.8)	3(33.3)
5	38 (14.7)	134 (25.5)	2(22.2)
6 and more	11 (4.7)	39 (7.4)	1(11.1)

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Occupation of mother			
Labor intensive	179 (69.4)	389 (74.1)	1(1.1)
Non-labor intensive	79 (30.6)	136 (25.9)	8(88.9)
Per capita income (in Indian National Rupees)			
< 1000	60(23.2)	73(13.9)	0(0.0)
1000-<2000	122(47.3)	143(27.2)	1(11.1)
2001-<5000	56(21.7)	208(39.6)	4(44.4)
>5000	20(7.6)	101(19.2)	4(44.4)
Diet			
Veg	151(58.5)	197(37.5)	5(55.6)
Non-veg	107(41.5)	328(62.5)	4(44.4)

Table 2: Distribution of study participants by clinical and obstetric features (n=792)

Variable	Birth Weight		
	Low (< 2.5 Kg) n=258 (%)	Normal (2.5 – 4.0 Kg) n=525(%)	High (> 4 Kg) n=9(%)
Time since last pregnancy			
< 1 year	124(48.1)	105(20.0)	0()
1-3 year	102(39.5)	142(27.0)	5(55.6)
> 3 year	32(12.4)	278(53.0)	4(44.4)
Number of children			
0	107(41.5)	137(26.1)	2(22.2)
1-2	119(46.1)	293(55.8)	5(55.6)
3 and more	32(12.4)	95(18.1)	2(22.2)
Height of mother			
< 146 cm	180(69.8)	133(25.3)	1(11.1)
146 cm and more	78(30.2)	392(74.7)	8(88.9)
History of abortion			
Yes	106(41.1)	118(22.5)	1(11.1)
No	152(58.9)	407(77.5)	8(88.9)
Consumed at least 50 or more IFA tablet during pregnancy			
Yes	55(21.3)	333(63.4)	4(44.4)
No	203(78.7)	192(36.6)	5(55.5)
History of hypertension/pre-eclampsia during pregnancy			
Yes	163(63.2)	87(16.6)	0(0.0)
No	95(36.8)	438(83.4)	9(100.0)
Gestation age at delivery			
Term	134(51.9)	502(95.6)	9(100.0)
Pre-term	124(48.1)	23(4.9)	0(0.0)
Hemoglobin at time of delivery			
Non-anemic	0(0.0)	106(20.2)	0(0.0)
Mild anemia	98(38.0)	217(41.3)	0(0.0)
Moderate anemia	98(38.0)	170(32.4)	3(33.3)
Severe anemia	62(24.0)	32(6.1)	6(66.7)
Type of delivery			
Normal vaginal delivery	116 (45.0)	350(66.7)	1(11.1)
Caesarian section	142 (55.0)	175(33.3)	8(88.9)
Tobacco consumption during pregnancy			
Yes	159 (61.6)	201 (38.3)	2(22.2)
No	99 (38.4)	324 (61.7)	7(77.8)
Number of ANCs Visits			
0-1	68 (26.4)	71 (13.5)	0(0.0)
2-3	171 (66.3)	306 (58.3)	6(66.7)
4 and more	19 (7.3)	148 (28.2)	3(33.3)

Table 3: Predictors of Low birth weight among study participants in multivariable analysis

Variable	AOR (CI)	P value
Tobacco consumption during pregnancy		
Yes	2.68 (1.08- 3.94)	0.01
No	1.00	
Hypertension/pre-eclampsia during pregnancy		
Yes	3.96 (1.59-5.27)	0.012
No	1.00	
Severe anemia during pregnancy		
Yes	1.80 (0.75-2.58)	0.003
No	1.00	
Consumed 50 or more IFA during current pregnancy		
No	2.32 (0.78- 3.63)	0.001
Yes	1	
Height of mother		
Yes	1.61 (1.03- 2.79)	0.06
No	1.00	
Labor intensive occupation		
Yes	3.46 (1.39-5.27)	0.07
No	1.00	
Gestation age at delivery		
Pre-Term	4.45 (1.23- 6.19)	0.084
Term	1.00	

AOR: Adjusted Odds Ratio, CI: Confidence interval

References:

1. World Health Organization, International statistical classification of diseases and related health problems, tenth revision, World Health Organization, Geneva, 1992.
2. World Health Organization. Low birth weight Global targets 2025- policy brief. To improve maternal, infant and young child nutrition (www.who.int/nutrition/topics/nutrition_ globaltargets2025/en/, accessed 17 August 2016).
3. Ashworth A (1998) Effects of intrauterine growth retardation on mortality and morbidity in infants and young children. Eur J Clin Nutr 52 Suppl 1: S34–41; discussion S41–32. PMID: 9511018
4. Christian P, Murray-Kolb LE, Tielsch JM, Katz J, LeClerq SC, et al. (2014) Associations between preterm birth, small-for-gestational age, and neonatal morbidity and cognitive function among school-age children in Nepal. BMC Pediatr 14: 58. doi: 10.1186/1471-2431-14-58 PMID: 24575933
5. McIntire DD, Bloom SL, Casey BM, Leveno KJ (1999) Birth Weight in Relation to Morbidity and Mortality among Newborn Infants. New England Journal of Medicine 340: 1234–1238. PMID: 10210706
6. Villar J, Belizan JM (1982) The relative contribution of prematurity and fetal growth retardation to low birth weight in developing and developed societies. Am J Obstet Gynecol 143: 793–798. PMID: 7102746
7. Albertsson-Wikland K, Karlberg J (1994) Natural growth in children born

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small for gestational age with and without catch-up growth. Acta Pædiatrica 83: 64–70.

8. Aylward GP, Pfeiffer SI, Wright A, Verhulst SJ (1989) Outcome studies of low birth weight infants published in the last decade: a metaanalysis. J Pediatr 115: 515–520. PMID: 2795341
9. Choudhary AK, Choudhary A, Tiwari SC, Dwivedi R (2013) Factors associated with low birth weight among newborns in an urban slum community in Bhopal. Indian J Public Health 57: 20–23. doi: 10.4103/0019-557X.111362 PMID: 23649138
10. Nutritional anaemias. Report of a WHO scientific group. Geneva, World Health Organization, 1968. (WHO Technical Report Series, No. 405). Available at http://whqlibdoc.who.int/trs/WHO_TRS_405.pdf
11. Singh S, Shrestha S, Marahatta S (2011) Incidence and risk factors of low birth weight babies born in Dhulikhel Hospital.
12. Mavalankar DV, Gray RH, Trivedi CR (1992) Risk factors for preterm and term low birthweight in Ahmedabad, India. Int J Epidemiol 21: 263–272. PMID: 1428479
13. Agarwal S, Agarwal A, Agarwal KN, Agarwal DK, Bansal A (2001) Physical activity and pregnancy outcome in rural undernourished women. Indian pediatrics 38: 1017–1022. PMID: 11568377
14. Khanal V, Sauer K, Karkee R, Zhao Y (2014) Factors associated with small size at birth in Nepal: further analysis of Nepal Demographic and Health Survey 2011. BMC Pregnancy Childbirth 14: 32. doi: 10.1186/1471-2393-14-32 PMID: 24438693
15. Dickute J, Padaiga Z, Grabauskas V, Gaizauskiene A, Basys V, et al. (2002) Do maternal social factors, health behavior and work conditions during pregnancy increase the risk of low birth weight in Lithuania? Medicina (Kaunas) 38: 321–332. PMID: 12474706
16. Rasmussen K (2001) Is There a Causal Relationship between Iron Deficiency or Iron-Deficiency Anemia and Weight at Birth, Length of Gestation and Perinatal Mortality? J Nutr 131: 590S–601S; discussion 601S–603S. PMID: 11160592