



Prevalence and risk factors affecting low birth weight in a district hospital at Perambalur, Tamilnadu

Rahul Hanumant Dandekar^{1*}, Mohd. Shafee², Sati Prasad Sinha³

ABSTRACT

The low birth weight is an index of our status of public health in general and of maternal health and nutrition in particular. The major challenge in the field of public health is to identify the factors influencing low birth weight and to institute remedial measures. This hospital based cross-sectional study was conducted to know the prevalence and to identify risk factors affecting low birth weight in a District Hospital at Perambalur, Tamilnadu during six months period. All pregnant mothers who delivered babies in District Hospital were included in this study. Sample size 300 was calculated by taking 25% as the minimum prevalence of low birth weight with 20% permissible error. The statistical analysis was done by Epi Info™ 7 (7.1.2) software packages. The prevalence of LBW was found as 11.67% in 300 mothers while it was 21.5% in NFHS-3. Significant association was found between Low birth weight and weight gain in pregnancy. Though the prevalence of LBW is lower than national level, it is the need of the hour to strengthen the existing maternal services at the basic level of community.

Keywords: Low birth weight, risk factors, prevalence.

INTRODUCTION

Babies with a birth weight of less than 2500gm, irrespective of the period of their gestation are termed as Low Birth Weight (LBW) babies.¹ Low birth weight is an indicator of future health and survival of child. It is an important factor to determine whether child is ready to adjust his surroundings.² It leads to inhibited growth, cognitive development and also associated with chronic diseases later in life.^{3,4}

In India, the prevalence of LBW infants is about 33%, as compared to 4.5% in industrially developed countries.^{5, 6} In 2011, Indian Statistical Institute reported nearly 20% of new born have LBW in India.⁷ Also LBW is 21.5% as per NFHS-3.⁸ LBW is the strongest determinant of infant morbidity and mortality in India. The perinatal mortality among LBW infants is about eight times higher than that in infants weighing more than 2.5kg.⁹

The low birth weight is an index of our status of public health, maternal health and nutrition in particular. The major challenge in the field of public health is to identify the factors influencing low birth weight and to institute remedial measures.¹⁰ LBW is a multi-faceted problem with some known and few unknown reasons. The etiology of LBW is also complex with demographic, nutritional, reproductive, and socio-economic factors each potentially playing a role. These causes can be enlisted as maternal Hemoglobin (Hb) level, hard manual work during antenatal period, maternal nutrition, economic condition, antenatal care, parent's education, tobacco use, maternal age, and parity.¹¹

GJMEDPH 2014; Vol. 3, issue 2

¹ Assistant Professor
Department of Community
Medicine
Dhanalakshmi Srinivasan Medical
College and Hospital
Siruvachur, Perambalur– 621212
Tamil Nadu

² Professor and Head, Dept. of
Community Medicine
JIIU's Indian Institute of Medical
Science and Research
Warudi, Tq. Badnapur, Jalna-
431202, Maharashtra.

³ Professor and Head of
Department
Department of Community
Medicine
Dhanalakshmi Srinivasan Medical
College and Hospital
Siruvachur, Perambalur, Tamil
Nadu – 621212

*Corresponding Author
Department of Community
Medicine
Dhanalakshmi Srinivasan Medical
College and Hospital
Siruvachur, Perambalur– 621212
Tamil Nadu
Phone: +91-9923194461
Email: rh.dandekar@gmail.com

Conflict of Interest—none

Funding—none

Hence, this study was conducted to know the prevalence and to identify risk factors affecting low birth weight in a District Hospital at Perambalur, Tamilnadu.

MATERIALS AND METHODS

The present prospective cross sectional hospital based study was conducted in a District Hospital at Perambalur, Tamilnadu in 2013 from June to November. The sample size 300 was calculated taking minimum 25% prevalence of low birth weight with 20% permissible error. All 300 postnatal mothers who delivered in the hospital during study period were included in the study except still births. They were interviewed using predesigned and pretested questionnaires and the information regarding the study variables were collected after obtaining consent form.

The birth weight of child was measured in gram within one hour after delivery using pretested and pre-calibrated Salter weighing machine (UNICEF). Birth weight less than 2500 g was used to label a child as LBW. Mother's height was measured up to the accuracy of 0.5 cm by height measuring stand and weight was recorded on weighing machine up to the accuracy of 0.5 kg.

The Socio-demographic variables were address, mother's age in years, mother's education, husband education with occupation and per capita income. Also other risk factor variables as any eventful antenatal period, current type of delivery, hard physical work during pregnancy, height of mother in cm, parity, previous child birth weight in kg, previous type of delivery, type of family and weight gain during pregnancy in kg.

Data was processed by using software package Epi Info™ 7 (7.1.2) from Centers for Disease Control and Prevention, USA. The information was analyzed by appropriate statistical tests. Results were expressed in percentages, odds ratios, 95% confidence interval of odds ratio and chi square tests (χ^2). The p value less than 0.05 were taken as statistically significant.

RESULTS

The prevalence of Low birth weight in this study was found as 11.67%. The proportion of LBW babies was more in mothers from rural area (71.43%) than urban area (2.86%). LBW babies were found in 2(8.33%) mothers with age less than 20 years. In nuclear type of family, there were 12(34.29%) LBW babies whereas 23(65.71%) babies in joint and three generation type of family. There were 33(94.29%) literate mothers and 34(97.14% literate fathers with LBW babies. The family of 25.41% mothers with LBW babies had per capita income less than 2000 rupees. The socio-demographic variables such as residence of the mother, maternal age less than 20 years, mother literacy status, husband education and occupation, type of family and per capita income less than 2000 rupees had no significant association with low birth weight.

The antenatal care (ANC) was received by all participant mothers. But only 144(48%) mothers were attended more than three ANC visits. Despite of more than three ANC visits, there were 17(12.06%) mothers with LBW babies. More number of babies with LBW (23) was found with mothers consuming more than 50 iron folic acid tablets. Only two mothers with hard physical work had LBW. There were 16(12.12%) LBW babies whose mothers experienced with obstetrics complications of uneventful antenatal period. However, ANC care such as ANC checkups, IFA tablets consumption, hard physical work during pregnancy and any eventful antenatal period had no significant association with low birth weight

The mothers with 18(51.43%) LBW babies were primigravida and 17(48.57%) multigravida. Short stature less than 145 cm was found in mothers with LBW babies. LBW was significantly associated in 26(9.52%) babies with mothers weight gain during pregnancy more than 6 kg. There were 10(28.57%) LBW babies whose delivery was conducted by caesarean section. The five mothers who were already given births to LBW babies in previous deliveries had again LBW babies in current delivery.

Table 1 Distribution of Low Birth Weight according to socio-demographic variables

Variables		LBW n=35 No(%)	Normal birth n=265 No(%)	Odds Ratio (95 Confidence interval)	P Value
Address	Urban	10(12.99)	67(87.01)	1.18(0.54-2.59)	0.68
	Rural	25(11.21)	198(88.79)		
Mothers age in years	Below 20	2(8.33)	22(91.67)	0.67(0.10-2.60)	0.90
	Above 20	33(11.96)	243(88.04)		
Mothers education	Illiterate	2(7.41)	25(92.59)	0.58(0.06-2.54)	0.47
	Literate	33(12.09)	240(87.91)		
Husband education	Illiterate	1(7.14)	13(92.86)	0.57(0.07-4.50)	0.59
	Literate	34(11.89)	252(88.11)		
Husband occupation	Unskilled	27(12.80)	184(87.20)	1.49(0.65-3.41)	0.35
	Skilled	8(8.99)	81(91.01)		
Type of family	Nuclear	12(10.00)	108(90.00)	0.76(0.36-1.59)	0.46
	Joint & three gen.	23(12.78)	157(87.22)		
Per capita income in Rs	Less than 2000	9(12.50)	63(23.77)	1.11(0.49-0.06)	0.80
	More Than 2000	26(11.40)	202(88.60)		

Table 2 Distribution of Low Birth Weight according to antenatal care variables

Variables		LBW n=35 No(%)	Normal birth n=265 No(%)	Odds Ratio (95 Confidence interval)	P Value
Parity	Primigravida	18(11.32)	141(88.68)	0.93(0.46-1.89)	0.84
	Multigravida	17(12.06)	124(87.94)		
Birth interval (yrs) (n=143)	< 2	9(40.91)	13(59.09)	1.46(0.57-3.70)	0.43
	≥ 2	39(32.23)	82(67.77)		
Period of gestation (wks)	< 37	14(34.15)	27(10.19)	5.88(2.68-12.88)	<0.05
	≥ 37	21(8.11)	238(89.81)		
Antenatal checkups	<3 visits	18(11.32)	141(88.68)	0.93(0.46-1.89)	0.84
	≥ 3 visits	17(12.06)	124(87.94)		
IFA tablets consumption	< 50 tablets	12(12.12)	87(87.88)	1.07(0.51-2.25)	0.86
	≥ 50 tablets	23(11.44)	178(88.56)		
Hard physical work	Yes	2(22.22)	7(77.78)	2.23(0.2112.37)	0.57
	No	33(11.34)	258(88.66)		
Any eventful ANC	Yes	16(12.12)	116(87.88)	1.08(0.53-2.19)	0.85
	No	19(11.31)	159(88.69)		

Table 3 Distribution of low birth weight according to maternal anthropometry and other risk factors

Variables		LBW n=35 No(%)	Normal birth n=265 No(%)	Odds Ratio (95 Confidence interval)	P Value
Height of mother (cm)	< 145	7(18.92)	30(81.08)	1.96(0.79-4.87)	0.14
	>145	28(10.65)	235(89.35)		
Weight gain in pregnancy (kg)	Less Than 6	9(33.33)	18(66.67)	4.75(1.93-11.64)	<0.05
	More Than 6	26(9.52)	247(90.48)		
Current delivery	Caesarean	10(8.85)	103(91.15)	0.63(0.29-1.36)	0.24
	Normal	25(14.12)	162(86.63)		
Status of previous births	LBW	5(17.24)	24(82.76)	1.67(0.59-4.71)	0.33
	Normal	30(11.07)	241(88.93)		
Previous delivery	Caesarean	4(11.76)	30(88.24)	1.01(0.33-3.06)	0.98
	Normal	31(11.65)	235(88.35)		

DISCUSSION

Socio-demographic risk factors for LBW

The proportion of Low Birth Weight in the present study was 11.67% while it was 21.5% from NFHS-3 data.⁹ A similar prevalence was found in study by Mumbare SS et al and Sharma MK et al.^{12, 13} The variation in the prevalence may be due to varying geographic and socioeconomic differences among the different communities. In present study, the proportion of low birth weight was high among those mothers residing in rural area (71.43%) whereas it was 28% in study by Swarnalatha N.¹⁴ The LBW was 8.33% among mothers less than 20 years of age which was lower than studies by Velankar DH and Anand et al.^{10, 15} Young age of mother and inadequate development of uterus can cause low birth weight babies

In present study, the proportion of LBW was found to be low among illiterate women (5.71%). Rizvi et al and Mavalankar et al showed significant association between maternal education and LBW.^{16, 17} The low prevalence of low birth weight in relation to illiteracy may be linked to awareness regarding the need for antenatal care services and their utilization. High proportion of low birth weight was found in less than 2000 rupees per capita income (25.71%). There was no statistical significance association between and LBW and family income. High prevalence of LBW in low socioeconomic status have also reported in other studies.^{10, 13, 17, 18}

LBW according to antenatal care

In the present study, low birth weight was 11.31% in primipara. The studies by Kamaladoss T et al and Acharya D et al reported that significant association of low birth weight with prim parity.^{19, 20} The proportion of LBW was high among those mothers with narrow birth interval of less than 2 years (40.90%). Similar finding was revealed by the studies conducted in Velankar DH and Joshi HS et al.^{10, 21} This may be due to mothers cannot recover from the effect of last pregnancy before conceiving again and her nutritional status deteriorates with subsequent pregnancies. Hence the birth spacing at least more than 2 years in preventing LBW babies is important. In this study 34.15% mothers had low birth weight with a gestational age of less than 37 weeks. It was found that the period of gestation (<37 weeks) was statistically associated with LBW.

Studies carried out in Idris MZ et al and Phaneendra Rao et al had also found significant inverse association of low birth weight with gestational age.^{22, 23}

The proportion of LBW was high among mothers who had less than 3 required antenatal checkups indicating as a determinant of LBW. Joshi et al and Idris et al also published the similar findings in their study.^{21, 22} This may be due to noncompliance of advice/drugs during antenatal period. This emphasizes the need to improve both the coverage and quality of ante-natal care to reduce LBW. The consumption of number iron and folic acid (IFA) tablets less than 50 were found in mothers with 12.12% LBW babies. Therefore efforts should be made to provide regular supplementation of iron and dietary modification.

The prevalence of low birth weight was found to be high in women engaged in hard physical work in pregnancy (22.22%). Joshi et al and Idris et al also reported the association between low birth weight and hard physical labor.^{21, 22} A hard physical works during pregnancy will upset the balance in women with marginal nutritional deficiencies and lead to early onset of labor causing prematurity.

LBW according to maternal anthropometry and other risk factors

In this study, the proportion of low birth weight (18.92%) was found to be high among those women with short stature (<145 cm). Trivedi CR et al and Velankar DH studies reported a significant association between maternal height and low birth weight.^{6, 10} The prevalence of low birth weight was found to be high in women with less than 6 kg weight gain during pregnancy (33.33%). Significant relationship was found between maternal weight gain during pregnancy and the LBW in other studies.^{10, 15, 19} Hence it is recommended to improve the nutritional status of a girl child throughout her life cycle as it will improve the nutritional status of women and will reduce the problem of LBW.

CONCLUSION

Though the prevalence of LBW is lower than national level, it is the need of the hour to strengthen the existing maternal services at the basic level of community i.e., at door steps of the beneficiaries. Inter pregnancy interval may be



improved through different contraceptive methods of spacing. The study suggests focusing attention on health education of mothers. Among various

risk factors for LBW, period of gestation and weight gain during pregnancy were found as significant determinants of LBW.

REFERENCES

1. Kramer Ms. Determinants of LBW, methodological assessment and meta-analysis. WHO Bull, 1987; 65: 663-737.
2. Pratinidhi AK, Shrotri AN, Shah U, Bodhani ND. Domiciliary care of low birth weight neonates. Indian J Pediatr. 1986; 53(1): 87-92.
3. UNICEF. Low Birth Weight: Country, Regional and Global Estimates. New York: UNICEF; 2004. p. 1-9.
4. Barker DJ. Faetal and Infant Origins of Diseases. London: BMJ Books; 1992.
5. UNICEF. The progress of Nations, New York, United Nations Children's Fund, 1997.
6. Trivedi CR, Mavalankar DV. Epidemiology of low birth weight in Ahmedabad. *Ind J Paed* 1986; 53: 795-800.
7. Bharati P, Pal M, Bandyopadhyay M, Bhakta A, Chakraborty S, Bharati P Prevalence and causes of low birth weight in India. *Malays J Nutr*. 2011 Dec;17(3):301-13.
8. International Institute of Population Sciences, National Family Health Survey, India; 2005-06 (NFHS-3, vol1) 2007; 223.
9. Karan S, Mathur B, Surender YA *et al*. Incidence and causes of perinatal mortality at the institute of child health hospital. *Ind Paediatr* 1972; 99-105.
10. Velankar DH. Maternal factors contributing to Low birth weight babies in an urban slum community of Greater Mumbai. *Bombay Hospital Journal*. 2009; 51(1):26-35.
11. Kadam YR, Mimansa A, Chavan PV, Gore AD. Effect of Prenatal Exposure to Kitchen Fuel on Birth Weight. *Indian J Community Med*. 2013 Oct;38(4):212-216.
12. Mumbare SS, Girish Maindarkar, Rajesh Darade, Surekha Yenges, Madhav kumar and Kiran Patole. Maternal Risk Factors Associated with Term Low Birth Weight Neonates: 13. A Matched-Pair-Case Control Study. *Indian Pediatrics*. 2011; May 30.
13. Sharma MK., Kumar D, Huria A & Gupta P: Maternal risk factors of Low birth weight in Chandigarh India. *The internet Journal of Health*. 2009; 9(1):DOI:10.5580/10f1
14. Swarnalatha N, Bhuvanewari P. An epidemiological study of low birth weight in a tertiary care hospital, Tirupati, Andhra Pradesh. *IJCRR*. 2013; 5(16): 54-62.
15. Anand K, Garg BS. A study of factors affecting Low birth weight. *Indian J Com Med* 2000; 25(2): 57-62.
16. Rizvi SA, Hatcher J, Jehan I and Qureshi R. Maternal risk factors associated low birth weight in Karachi: A case control study. *Eastern Mediterranean Health Journal* 2007; 13(6): 1343-52.
17. Mavalankar DV, Gray RH, Trivedi CR. Risk factors for preterm and term low birth weight in Ahmedabad. *Indian Journal of Epidemiology* 1992; 21(2):263-72.
18. Kiran A, Garg BS. A study of factors affecting LBW. *Indian Journal of community medicine* 2000;25:57-62
19. Kamaladoss T, Abel R, Sampathkumar V. Risk correlates of low birth weight in rural Tamil Nadu. *Ind J Pediatr* 1992; 59(3):299-304.
20. Acharya D, Nagraj K, Nair NS, Bhat HV. Determinants of Intrauterine Growth Retardation: A Case Control Study in Udupi District, Karnataka. *Indian Journal of Community Medicine*.2004; 29(4):181-82.
21. Joshi HS, Subba SH, Dabral SB, Dwivedi S, Kumar D, Singh S. Risk factors associated with Low birth weight in newborns. *Indian Journal of Community Medicine*. 2005; 30(4): 142-3.
22. Idris MZ, Gupta A, Mohan U, Srivastava AK, Das V. Maternal health and LBW among institutional deliveries. *Indian J Community Med* 2000; 25(4):156-60.
23. Phaneendra Rao RS, Prakash KP, Sreekumaran Nair N. Influence of Pre-Pregnancy Weight, Maternal Height and Weight Gain During Pregnancy on Birth Weight. *Bahrain Medical bulletin* 2001; 23(1):1-8.