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Original Research Article

STUDY OF RISK FACTORS ASSOCIATED WITH LOW BIRTH WEIGHT (LBW) BABIES BORN IN A HOSPITAL

Krishan Kumar[1], Mohit Gupta[2], Neha Punia[3], Amit[4]

[1]Assistant Professor, NC Medical College, Israna, Panipat, India.
[2]Associate Professor, NC Medical College, Israna, Panipat, India.
[3]Assistant Professor, NC Medical College, Israna, Panipat, India.
[4]Assistant Professor, NC Medical College, Israna, Panipat, India.

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Corresponding Author:
Amit,
Email: amit.panchal201172@gmail.com

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ABSTRACT

Background: LBW is a significant determinant of infant and childhood morbidity, particularly of neurodevelopment impairment such as mental retardation and learning disability.[3] LBW is attributed to multifactorial causes such as genetic factors, socio-demographic factors, obstetric factors, nutritional factors, maternal morbidity during pregnancy, toxic exposures and antenatal care. The present study is done to study the role of maternal, fetal and environmental factors affecting the birth weight of babies born in hospital and also to study the risk factors for LBW in newborns. **Materials and Methods:** It is a hospital- based case control study, all live newborns weighing < 2.5 kg were included in the study whereas all newborns weighing > 2.5 kgs were taken as controls. Multiple births (twins, triplets), those with congenital malformations, infant of diabetic mother and those who didn't give consent were excluded from the study. **Results:** Among the maternal nutritive variables [low BMI, anemia, insufficient protein and energy intake in mothers during antenatal period], among the environmental variables, [unsafe source of drinking water (ground water) and passive smoking] and obstetric variables [ANC visits <4, short birth interval (<2 years), history of previous abortions, anemia, placenta previa, premature rupture of membranes] were found to be the significant independent predictors of LBW. It was also found that anemia in mothers is also a significant predictor of LBW. **Conclusions:** The present study states that different maternal, nutritive, environmental and obstetric characteristics of the population are still the important factors in causing LBW among the newborn.

INTRODUCTION

Low birth weight continues to be a significant public health problem globally and is associated with a range of both immediate and long-term complications. Low birth weight (LBW) has been defined by the World Health Organization (WHO) as weight at birth of less than 2500g.[1] It is a result of preterm birth or intrauterine growth restriction (IUGR), the later being the major cause in India.

India accounts more than 40% of the global burden of LBW babies with 7.5 million babies being born with a birth weight less than 2500 grams.[2] Of these, 60% are born at term after fetal growth restriction, while the remaining are born preterm, constituting a quarter of the global burden of preterm births.[2]

LBW is a significant determinant of infant and childhood morbidity, particularly of neurodevelopment impairment such as mental retardation and learning disability.[3] LBW is attributed to multifactorial causes such as genetic factors, socio-demographic factors, obstetric factors, nutritional factors, maternal morbidity during pregnancy, toxic exposures and antenatal care are all reported to influence the occurrence of LBW.[3-5] The prevention of low birth weight is a public health priority, particularly in developing countries with high magnitude.

Hence, the present study is carried out to explore the determinants of LBW and is an effort to bridge the gaps in existing knowledge.

MATERIALS AND METHODS

It is a hospital- based case control study conducted from march, 2017 to September 2018 at a tertiary health care Centre in North India. All live newborns weighing < 2.5 kg were included in the study whereas all newborns weighing > 2.5 kgs were taken as controls. Multiple births (twins, triplets), those with congenital malformations, infant of diabetic mother and those who didn't give consent were excluded from the study.

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Aims and Objectives

1. To study the role of maternal, fetal and environmental factors affecting the birth weight of babies born in hospital.
2. To study the risk factors for LBW in newborns.

The sample size calculated for the study came out to be 800 (400 per group). The following parameters were recorded in all the study participants- Maternal (age, weight gain during pregnancy , height, BMI, anemia, pre – pregnancy weight, any acute/chronic illness, history of previous preterm and LBW babies, parity, antenatal care visits, inter-conception period, diet), Fetal (gestational age, gender, any congenital anomaly, IUGR) and Environmental (education, Profession, Socioeconomic status, water and sanitation hygiene, Smoking (active or passive), Alcohol and tobacco consumption).

Data was collected about demography, anthropometry, ANC care, routine investigations, records, obstetric history, medical and surgical history, environmental exposures (active or passive smoking) and dietary history (of diet prior to hospital admission) by 24 hour recall method.

Quantitative and qualitative variables were compared using Unpaired t-test/Mann-Whitney test and Chi-Square test /Fisher's exact test respectively. Univariate and Multivariate logistic regression was used to assess the significant risk factors of Low birth weight.

RESULTS

Demographics of the study population: mean weight of 400 study cases (LBW) was 1.8±0.4 kg and that of 400 controls (NBW) was 2.95±0.3 kg (P=0.001). Among cases, 78 % were preterm and 22% were term , where in control group, 2.75 % were preterm and 97.25% were term (P=0.001). There was no statistically significant difference in gender distribution of cases and controls (p value=0.570). There were 55.75% males in study group and 53.75% males in control group.

Table 1: Multivariate analysis of variables leading to low birth weight

Variables		Unadjusted OR (95%CI)	p value for Unadjusted OR	Adjusted OR (95%CI)	p value for Adjusted OR
Maternal age	≥ 30 years	1	0.280	-	-
	< 30 years	0.65 (0.46, 0.93)			
Parity	≥2	1	**0.001**	-	-
	<2	1.7 (1.30, 2.31)			
BMI	High	1	**0.001**	1	**0.001**
	Low	6.5 (3.6, 11.8)		16.3 (7.04, 37.8)	
BMI	High	1	**0.001**	1	**0.001**
	Normal	3.5 (2.5, 4.8)		4.02 (2.38, 6.8)	
Anemia	No	1	**0.001**	1	**0.001**
	Yes	2.09 (1.58, 2.78)		2.55 (1.53, 4.2)	
Placenta previa	No	1	0.062	1	**0.001**
	Yes	1.97 (0.97, 4.02)		18.3 (4.7, 70.3)	
Birth interval (<2 yrs)	≥2	1	**0.001**	1	**0.001**
	<2	12 (7.5,19.0)		22.1 (11.02, 44.0)	
	Primigravidae	2.4 (1.74, 3.34)		13.5 (7.44, 24.59)	
Number of ANC visits (<4)	>4	1	**< 0.001**	1	**0.001**
	<4	5.5 (3.37, 9.28)		6.8 (3.44, 13.5)	
Source of drinking water	Filter	1	**0.001**	1	**0.001**
	Ground water	3.5 (2.21, 5.65)		6.3 (2.83, 14.4)	
Passive smoking	No	1	**0.001**	-	-
	Yes	1.7 (1.25,2.4)			
Previous abortion	No	1	**0.003**	1	**0.001**
	Yes	1.75(1.21,2.53)		9.6 (4.45, 21.0)	
Protein intake	> 47 g/day	1	**0.001**	1	**0.026**
	<47 g/day	4.8 (3.54, 6.5)		2.06 (1.09, 3.89)	
Energy intake	> 1667 kcal/day	1	**0.001**	1	**0.001**
	<1667 kcal/day	5.5 (4.08, 7.5)		4.6 (2.62, 8.11)	
PROM	No	1	**<0.001**	1	**0.001**
	Yes	2.75 (1.97,3.84)		10.9 (6.12, 19.6)	

Table I shows unadjusted and adjusted odds ratio, p value and 95% CI obtained for the risk factors associated with LBW. Among these maternal nutritive variables, low BMI, anemia, insufficient protein and energy intake in mothers during antenatal period were found to be the significant independent predictors of LBW. Among environmental variables, unsafe source of drinking water (ground water) and passive smoking were found to be the significant independent predictors of LBW. Among obstetric variables, ANC visits <4, short birth interval (<2 years), history of previous abortions, anemia,

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placenta previa, premature rupture of membranes were found to be the significant independent predictors of LBW. It was also found that anemia in mothers is also a significant predictor of LBW.

DISCUSSION

LBW is major health problem which causes high mortality as well as high morbidity in newborn, especially in developing countries, like our country. Like various other studies done in developed & developing countries,[6-8] we also found that many maternal, social-demographic, obstetric, environmental factors contribute to the occurrence of LBW baby.

Socio Demographic parameters among study population Among socio-demographic variables, none was found to be independent predictor of LBW. In the present study, a higher proportion of mothers among cases were aged more than 30 years (23.25% v/s 16.5%),) as compared to controls (p value=0.017), however, on multivariate analysis the results were not statistically significant. Previous reports from India, Taywade ML et al,[9] and Sharma et al,[7] found that age > 30 yrs is a risk factor for LBW. However, Kramer in his meta-analysis on determinants of LBW had observed low maternal age as an important risk factor and its causal effect was established.[10]

Kramer in his meta-analysis on determinants of low birth weight had observed socioeconomic status as an important risk factor.[10] But, in the present study, the association was not statistically significant. In the present study, usual place of residence of family was statistically not significant and did not affect the birth weight of newborn. However, in the national collaborative study done by ICMR covering both urban and rural population, the prevalence of LBW ranged from 27 to 56% in urban and 31 to 41% in rural births.[11] Nearly one-third (38%) among the rural cohort had birth weight of 2500 g or less as compared to 41.4% in the urban area.[11]

Environmental factors among study

Among environmental variables, unsafe source of drinking water (ground water) was found to be the significant independent predictor of LBW. This can be explained that ground water may be contaminated with heavy metals which affects the outcome of pregnancy. However, Taywade et al did not find any association between unsafe drinking water and LBW.[9] In study by Avantika et al,[6] passive smoking is a risk factor for LBW, which is consistent in the present study which shows passive smoking significantly associated with LBW (p= 0.001) on univariate analysis.

In present study, open field defecation showed significant association with occurrence of LBW babies (p value 0.036). Similarly, in a study by Taywade et al, the absence of sanitary latrine was found to be significantly associated with LBW.[9] Other factors like pet at home, hand wash before meal, cooking method had no association with LBW in the present study.

Maternal nutritional status among study population

Among maternal nutritive variables, thinness of mothers (low BMI), insufficient protein and energy intake in mothers during antenatal period were found to be the significant independent predictors of LBW in our study. In the present study we also found higher odds of being low birth weight if the mother is thin as compared to overweight mother. However, Ojha et al did not find significant difference between BMI and low birth weight.[12]

Maternal co-morbid condition among study population

In our study, anemic mothers (hemoglobin <11 g/dl) were at increased risk to have LBW babies due to less intrauterine growth of baby when compared to non-anemic mothers (hemoglobin >11 g/dl). Hivre et al found that LBW babies are significantly more likely to be born to mothers whose hemoglobin was less than 9 gm/dl (RR:1.53).[13] Deshmukh in urban area of Nagpur, identified maternal anemia had significant, four times risk of low birth weight than non-anemic (OR:4.81).[14]

Obstetric parameters among study population

Among obstetric variables, ANC visits <4, short birth interval (<2 years), history of previous abortions, primiparity, placenta previa, premature rupture of membranes were found to be the significant independent predictors of LBW. Kramer in his meta-analysis on determinants of low birth weight had observed parity as an important risk factor and its causal effect was established.[10] Kramer also observed birth spacing and antenatal care as an important risk factor but their causal effect were uncertain.[10]

Fetal factors among study population

IUGR showed strong correlation with LBW which means IUGR is a major risk factor. No statistically significant difference was observed regarding gender of the newborn.

Limitations of study Samples are taken from hospital only, Single site study and memory/ Recall bias. Majority of mothers did not know their pre-pregnancy weight, so were not able to study this risk factor.

CONCLUSION

The present study states that different maternal, nutritive, environmental and obstetric characteristics of the population are still the important factors in causing LBW among the newborn. Many of these risk factors are modifiable. It can be recommended that births must be properly planned with the help of community health workers. Full utilization of the services from the health system must be made so that the nation gets healthy newborns and they lead a healthy life for building a better India.

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REFERENCES

1. World Health Organization, International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, World Health Organization, Geneva, Switzerland, 1992.
2. Resolution WHA65.6. Comprehensive implementation plan on maternal, infant and young child nutrition. In: Sixty-fifth World Health Assembly Geneva, 21–26 May 2012. Resolutions and decisions, annexes. Geneva: World Health Organization; 2012:12–13.
3. F. Chiarotti, A. M. Castignani, M. Puopolo et al., "Effects of socio environmental factors on neurocognitive performance in premature or low-birth weight preschoolers," Ann Ist SuperSanita 2001;37:553–559.
4. Aurora S, Vishnu BB, Srinivasan S, Puri R, Rajaram P. Maternal nutrition and birth weight. Indian J Mat Child Hlth, 1994;5:73–75.
5. Dharmalingam A, Navaneetham K, Krishkumar CS. Nutritional Status of Mothers and Low Birth Weight in India. Matern Child Health J 2010;14:290-8.
6. Singh A, Arya S, Chellani H, Aggarwal KC, Pandey RM. Prediction Model for Low Birth Weight and its Validation. Indian J Pediatr. 2014;81:24-28.
7. Sharma MK, Kumar D, Huria A, Gupta P. Maternal risk factors of low birth weight in Chandigarh, India. Internet J Health 2009;9:15.
8. Badshah S, Mason L, Mckelvie K, Payne R, Lisboa PJ. Risk factors for low birth weight in the public-hospitals at Peshawar, NWFP-Pakistan. BMC Publ Health 2008;8:197.
9. Taywade ML, Pisudde PM. Study of sociodemographic determinants of low birth weight in Wardha district, India. Clinical epidemiology and global health. 2017;5:14-20.
10. Kramer MS. Determinants of low birth weight: Methodological assessment and meta-analysis. Bull World Health Organ 1987; 65:663–737.
11. Bhargava SK, Sachdev HPS, Iyer PU, Ramji S. Current status of infant growth measurements in the perinatal period in India. Acta Paediatr. 1985;74:103–10.
12. Ojha N, Malla DS. Low birth weight at term: relationship with maternal anthropometry. J Nepal Med Assoc 2007;46:52-6.
13. Hirve SS, Ganatra BR. Determinants of low birth weight: a community based prospective cohort study. Indian Pediatr. 1994;31:1221–5.
14. Deshmukh JS, Motghare DD, Zodpey SP, Wadhva SK. A study of low birth weight and associated maternal factors in urban area. Indian Pediatr 1998;35:7–10.

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