Original Research Article

DETERMINANTS OF LOW BIRTH WEIGHT AMONG UNDER- 5 CHILDREN IN A RURAL AREA OF WEST BENGAL

Dr. Aparajita Dasgupta[1], Dr. Ishita Sarkar[2*], Dr. Bhaskar Shahbabu[3], Dr. Sudipta Das[3], Dr. Malay Kumar Das[3], Dr. Kaushik Sarkar[3]

1. Prof. and Head of the Dept. of P.S.M, AIIH&PH, Kolkata.
2. Junior Resident, M.D. Community Medicine, AIIH&PH, Kolkata
3. Junior Resident, MD Community Medicine PGT, AIIH&PH, Kolkata.

Abstract
Objectives: Birth weight is one of the most important determinants of neonatal and infant survival. A cross-sectional clinic based retrospective study was conducted in a rural area of West Bengal with the aim of finding out the magnitude of low birth weight among Under-5 children and to elicit its determinants. **Method**: The present study was undertaken in the immunization clinics of rural health centers of Singur Block which is under the rural field practice area of All India Institute of Hygiene & Public Health, Kolkata. All Under-5 children who came for immunization during the study period were taken as study population. Data were collected by interviewing the mother with the help of predesigned and pretested schedule and from the previous antenatal records. **Results**: The proportion of low birth weight (<2500 g) was 23.3%. Firstly a univariate analysis was done. The variables which were found to be significant were entered into the multiple logistic regression models. P value of <0.05 was considered significant. The significant variables in the multivariate analysis were poor weight gain during pregnancy, anaemia, and preterm gestation with Adjusted Odds Ratio (Confidence Interval) 5.22(1.94-14.05), 2.94(1.19-7.26) and 4.18(1.4-12.45) respectively. **Conclusion**: Proper Antenatal care, adequate dietary intake, sufficient consumption of IFA tablets and timely treatment of anaemia and hypertension during pregnancy can go a long way to address the problem of low birth weight among rural children.

Key Words- Low birth weight, univariate analysis, multiple logistic regressions

Introduction

Low birth weight is a weight at birth of less than 2500 gm (up to and including 2499 gm) irrespective of gestational age.[1] Low birth may be due to preterm or SGA (Small for gestational age i.e.-birth weight below 10th percentile of the average for the gestational age) which may again be due to constitutional or pathological causes like

anaemia, under nutrition, hypertension, infection etc.[2]

Low birth weight is one of the most serious challenges in maternal and child health all over the world. It is the single most important factor determining the survival chances of the child. The lower the birth weight the lower is the survival chance. Low birth weight significantly increases the prenatal mortality and morbidity. About two-thirds of all prenatal deaths occur among infants with less than 2500 gm birth weight. Major neonatal problems like hypoxia, Respiratory distress syndrome, hypothermia, infections, jaundice etc occur more commonly in Low birth weight babies. The principal cause of Infant mortality in India is also Low birth weight (57%). It causes increased morbidities in childhood with increased incidence of malnutrition, recurrent infection and mental retardation.[2]

It has been found that low birth weight babies are more liable to develop diabetes, hypertension and coronary heart disease in later life.[3-5]

Among regions, South Asia has the highest incidence of low birth weight, with one in four newborns weighing less than 2,500 grams. South Asia also has the highest rate of infants not weighed at birth (66 %). The target of reducing low birth weight incidence by 30 percent between 2010 and 2025 was endorsed by the World Health Assembly (WHA) in 2012.[6]

Thus low birth weight has an impact on community health and it is an important indicator for monitoring health of the community. Many of the factors causing low birth weight are preventable. It is possible to reduce the incidence of low birth babies with good prenatal care and cause specific intervention programme. Therefore it is necessary to find out the factors behind low birth weight specially the preventable ones.[7] With this background, the current study was undertaken in a rural area of West Bengal with the following objectives-

1. To find out the proportion/magnitude of Low birth weight among Under-5 children attending the immunization clinic of a rural area of West Bengal.

2. To elicit the determinants of Low birth weight among the study population.

Materials and Methods

Study Type - The study was cross sectional, clinic based and retrospective in nature.

Study Area- The study was conducted in the immunization clinics of Anandanagar and Dearah rural health centers of Singur Block which was under the rural field practice area of All India Institute of Hygiene & Public Health, Kolkata.

Study Period- The study period was from December 2014 to January 2015 i.e. 2 months.

Study Population- All Under-5 children who came for immunization during the study period were taken as study population with the following inclusion criteria-

- Mothers who had institutional deliveries
- Mothers who had antenatal records document.
- Mothers who gave consent for the study.

Total 180 child-mother pair had participated in the study.

Study Tools-

1. Predesigned and pretested semi structured schedule
2. antenatal records

The schedule consisted of two parts. First part included demographic and socioeconomic characteristics and the second part contained questions regarding birth weight and pregnancy related variables. This schedule was judged by the experts of the department where necessary corrections were made to enhance the face validity and content validity. Then translation into Bengali was done and semantic equivalence was maintained. Pretesting of the schedule was done by

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administering the questions to a small number of representative samples. Necessary modifications were made following their response.

All the information was collected by interviewing the mother after obtaining informed consent from them. Secondary data were obtained from the previous antenatal records.

Ethical Issues

This study was clinic based in nature. The participants of study were made aware about the nature and purpose of the study. It was also informed that the data will be kept confidential and will be used only for research or academic purpose. Informed consent was taken from the participants.

Statistical Analysis

Data were analyzed by using SPSS (Version 20). Descriptive statistics were use to describe the socio-demographic characteristics of the respondents. Continuous variables were presented as mean and standard deviations (SD), and categorical data were presented based on frequency and percentage. Firstly a univariate regression was done to ascertain the relationship of birth weight with other variables. Only those found to be significant were entered into the multiple logistic regression models. P value of <0.05 was considered significant.

Results

Mean age (SD) of the study population was 14.13 (13.0) months. Majority of them were girls (53.3%). 23.3 % of the study population had low birth weight. Mean birth weight (SD) was 2.67grams (0.40). Mean age of the mothers was 24.52 years with a SD of 4.06. Majority (33.3%) of the mothers had education up to secondary level and 3.4% of them were illiterate. Majority (90%) of the mothers were home makers. Mean per capita income was 1506.67 (SD-498.03) and highest number (73.4%) of the respondents belonged to Socioeconomic class IV (Modified BG Prasad Scale 2014) (Table 1)

Table 1: Distribution of study population according to socio-economic and demographic characteristics (n=180)

Variables		Frequency	Percentage (%)
Age(in months)	0-12	102	56.7
	12-36	60	33.3
	36-60	18	10.0
Sex	Boy	84	46.7
	Girl	96	53.3
Birth order	1st	110	61.2
	2nd	53	29.4
	≥3rd	17	9.4
Birth weight	<2500 gm	42	23.3
	≥2500 gm	138	76.7
Age of mothers(In completed years)	<20	20	11.1
	20-30	142	78.9
	≥30	18	10.0
Religion	Hindu	154	85.6
	Muslim	26	14.4

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Caste	General	96	53.3
	SC	66	36.7
	ST	18	10.0
Type of family	Nuclear	85	52.8
	Joint	95	47.2
Housing	Kuccha	24	13.3
	Pucca	60	33.3
	Semipucca	96	53.4
Education level Of mothers	Illiterate	6	3.4
	Primary (1-4)	18	10.0
	Middle (5-8)	54	30.0
	Secondary (9-10)	60	33.3
	Higher secondary (11-12)	34	18.9
	Graduate and above	8	4.4
Occupation Of mothers	Housewife	162	90.0
	Cultivator	5	2.8
	Shop owner	6	3.3
	Professional	7	3.9
Socioeconomic class (Prasad scale 2014)	Class I (PCI Rs$\geq$5571)	0	0
	Class II (PCI Rs2786-5570)	6	3.3
	Class III (PCI Rs 1671-2785)	36	20.0
	Class IV (PCI Rs 837-1670)	132	73.4
	Class V (PCI Rs $\leq$836)	6	3.3

Majority of the mothers were Primipara (61.1%) and 38.9% were multipara. The inter pregnancy interval (between last two pregnancies) among the mothers who were multipara was 3 years or more in most of the cases (55.7%). 66.7% of the mothers had registered themselves for Antenatal check up before 12 weeks and 82.8% of the mothers had gone for antenatal check up for at least 4 times.13.3% of the study population were preterm baby (born before 37 completed weeks). 35% of the mothers had anaemia and 6.7% had hypertension in pregnancy. (Table 2)

Table 2: Distribution of the respondents (mothers) according to pregnancy and Antenatal care related variables (n=180)

Variables		Frequency	Percentage
Parity	Primipara	110	61.1
	Multipara	70	38.9
Weight (at baseline) (in kg)	<40	18	10.0
	40-50	96	53.3
	>50	66	36.7
Height (in cm)	<145	22	12.2

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	≥145	158	87.8
Weight gain in pregnancy	≤8.5kg	79	43.9
	>8.5 Kg (Median)	101	56.1
Anaemia	Present	63	35
	Absent	117	65
IFA Taken	Adequate	127	29.4
	Inadequate	53	70.6
Tobacco use	Yes	4	2.2
	No	176	97.8
Diet	No extra diet	30	16.7
	Extra amount taken	48	26.7
	Extra meal taken	36	20.0
	Both extra amount and extra meal	66	36.7
Rest during pregnancy	<10 hours	62	34.4
	≥10 hours	118	65.6
Gestational duration	Preterm	24	13.3
	Term	156	86.7
TT (2 DOSES)	Taken	168	93.3
	Not Taken	12	6.7
Inter pregnancy interval (between last two pregnancies) (N=70)	<3 years	31	44.3
	≥3 years	39	55.7
Time of Registration	No registration	12	6.7
	After 16 weeks	18	10.0
	Between 12-16 weeks	30	16.7
	Before 12 weeks	120	66.7
Antenatal Check Up	<4	31	17.2
	≥4	149	82.8
hypertension in pregnancy	Yes	12	6.7
	No	168	93.3

In the bivariate analysis, the significant factors associated with increased risk of low birth weight were low education level of mother, low per capita income, and poor weight gain during pregnancy, inadequate diet, anaemia in pregnancy, inadequate consumption of IFA, hypertension in pregnancy and preterm gestation.

The variables already found significant in bivariate analysis were entered into a Multivariate Logistic model. The variables which remained significant in the multivariate analysis were poor weight gain during pregnancy, anaemia in pregnancy and preterm gestation. Strength of association of these variables was attenuated, when controlling for the other variables in the multivariate analysis. (Table 3)

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Table 3: Association between Low Birth Weight and Socio demographic and antenatal care related variables (n=180)
(The variables already found significant in bivariate analysis were entered into a Multivariate Logistic model)

Variables		Low birth weight Number (%)	OR (CI)	AOR (CI)
Mother's Education	<Secondary ≥Secondary	28 (35.9) 14 (13.7)	3.52 (1.69-7.14) 1	1.05 (0.40-2.74) 1
PCI	≤1500 >1500 (Median)	35 (29.4) 7 (11.5)	3.22 (1.33-7.69) 1	2.04 (0.63-6.59) 1
Weight gain (in kg)	≤8.5 >8.5	31 (39.2) 11 (10.9)	5.29 (2.48-12.50) 1	5.22 (1.94-14.05) 1
Diet	Inadequate Adequate	33 (31.1) 9 (12.2)	3.26 (1.45-7.35) 1	1.72 (0.65-4.55) 1
Anaemia in pregnancy	Yes No	25 (39.7) 17 (14.5)	3.87 (1.88-7.69) 1	2.94 (1.19-7.26) 1
IFA Taken	Inadequate Adequate	28 (35.9) 14 (13.7)	3.52 (1.69-7.14) 1	1.004 (0.38-2.63) 1
Hypertension in pregnancy	Yes No	6 (50.0) 36 (21.4)	3.31 (1.60-6.80) 1	1.38 (0.35-5.32) 1
Gestational Duration	Preterm Term	15 (62.5) 27 (17.3)	7.93 (3.15-20.0) 1	4.18 (1.40-12.45) 1

Foot Note:
- For the multivariate model, the Hosmer-Lemeshow test gave a Chi-square value of 10.5 (p=0.162, not significant) indicating good model fit
- Nagelkerke R^2 was 0.383 showing that the variables included in the model predicted 38.3 % of Low birth weight.

Discussion

This retrospective clinic based study showed proportion of Low birth weight to be 23.3%. This corroborates with NFHS data where prevalence of Low birth weight in rural area of India is 23%.[8] Though the proportion is found to be lower in comparison with a study done in Purulia district of West Bengal (31.3%),[9] and another study done in Hooghly district(28.8%).[7] The prevalence of low birth weight is found to be much lower in a study done in Vellore(11.8%),[10] while it is almost similar to a study done in Dehradun (23.8%).[11] Reasons might be, different study areas & study designs, influence of different risk factors and health service utilizations might also be different.

In the present study mother's education and Per capita income of the family were significantly associated with the incidence

of low birth weight. The higher the education of mother and per capita income of the family, lower was the incidence of low birth weight. These findings are consistent with the studies done in Purulia district, [9] and in Hooghly district[7] of West Bengal. Dowding has shown that socio economic class of the mother influences birth weight.[12] NFHS 3 also confirms that the proportion of births with a low birth weight is lesser among children born to women with higher educational qualifications as well as in families with higher socio economic status. [8]

Lower level of education might be associated with lower health awareness and health seeking behavior of the mothers whereas low per capita income of the family might have influenced other factors that were directly related to the nutritional status of the pregnant mothers e.g.- adequate dietary intake, proper weight gain, anaemia in pregnancy.

In this study, preterm birth (i.e. birth before 37 completed weeks of gestation) was found to be significantly associated with low birth weight in the study. Although in developing countries the major cause of low birth weight is intra uterine growth retardation but in developed countries majority cases of low birth weight occur due to preterm deliveries.[13]

It was also found that presence of anaemia and lack of proper consumption of IFA tablets increase low birth weight. This finding is consistent with Kramer's meta-analysis, [13] and studies conducted in Hooghly district,[7] and Purulia district of West Bengal.[9]

Other factors which were found to be significantly associated with low birth weight were inadequate weight gain during pregnancy, inadequate dietary intake and hypertension in pregnancy. These findings are consistent with studies done in rural area of Hooghly district,[7, 14] and rural area of Purulia district.[9]

Based on our findings it was clear that provision of antenatal care, like good counseling to take adequate food, rest and primary health care services is necessary, and it may be of relevance in reducing the burden of LBW. [9]

Conclusion

It should be stated that low birth weight still poses a fair problem in rural area of West Bengal. Some basic factors, like good ANC care, proper consumption of IFA tablets, treatment of anaemia and hypertension and above all motivation of the mothers by intensive health education to follow some habits in the ANC period like adequate consumption of food and adequate rest as well as promotion of institutional deliveries shall take a long way forward in addressing the problem. This message should be disseminated not only among the mother but also to the whole family which is responsible to take care of the mother during the antenatal period. It should be stressed that a healthy mother will certainly give birth to a healthy baby.

Acknowledgements

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