

Risk Factors for Low Birth Weight: An Experience from a Medical College Of West Bengal, India

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Abstract: Low birth weight is an important determinant of infant and childhood mortality and morbidity. In spite of nutritional transition, low birth weight remains an important public health problem in developing countries like India. With this context, the present study was conducted to find out the risk factors of low birth weight. A hospital based case-control study was undertaken in the post-natal wards of Bankura Sammilani Medical College & Hospital, Bankura from June 2017 to February 2018. A total 120 cases (low birth weight newborns) and another 120 matching controls (newborns not low birth weight) with a 1: 1 ratio were studied. Interview of the mothers by pre-tested and pre-designed questionnaire along with review of relevant records and reports were used for data collection. Information collected on selected maternal socio-cultural factors, health and nutrition services and maternal co-morbidities. Multi-variate logistic regression analysis done to identify the independent risk factors of low birth weight. Strength of association between outcome and risk factors expressed by Odds ratio along with 95% confidence interval. Though several risk factors were identified by univariate analysis, after adjustment with possible confounders by multi variate logistic regression, only teenage pregnancy (OR: 1.95; (95% CI: 1.15-3.30), no extra major meal taken during pregnancy (OR:2.19; 95% CI:1.30-3.67) and pre-term delivery (OR: 5.68; 95% CI: 2.87-11.22) were found independent risk factors of low birth weight babies.

Key Words: Low birth weight, newborn, risk factors, case-control study

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I. Introduction

Low birth weight is considered as the single most important predictor of Infant mortality, especially of deaths within the first month of life.¹ It's also a significant determinant of infant and childhood morbidity particularly neurodevelopmental impairment such as mental retardation and learning disabilities.² Birth Weight is a crucial factor in determining future growth as well as attacks of communicable diseases. Many maternal and fetal factors are found significantly to be associated with low birth weight³. Studies have shown that fetal growth and development to a great extent are influenced by the factors such as mother's inadequate nutrition, chronic diseases, hard physical work, maternal poor socio-economic condition^{4,5,6,7}. Maternal age, maternal education, area of residence were also known important determinants⁸, pregnancy related health and nutritional service related factors are also important in the district of Bankura.

Bankura Sammilani Medical College is a tertiary care hospital, where large numbers of mothers from varied geographical as well as different socio-cultural and economic background are admitted for their child-birth. Considering these facts, the present study was conducted to assess the risk factors of low birth weight babies those delivered at the Bankura Sammilani Medical College and Hospital, Bankura.

II. Material And Methods

Study Design and Study Setting: An institution based, observational, analytic study was conducted in a case-control design in the post-natal wards of the Department of Gynaecology and Obstetrics, Bankura Sammilani Medical College & Hospital, Bankura. The study was conducted from June 2017 to February 2018.

Study Participants and Respondent: Live newborn babies those were delivered during the data collection period and had birth weight less than 2500 grams were taken as cases. For comparison purpose,

newborns those had birth weight 2500 gm or more taken as controls. During selection of the controls, matching done as much as possible to reduce the known possible confounders.

Exclusion Criteria: Newborns as a result of multiple pregnancies, sick newborns those need special care either in sick neonatal care unit (SNCU) or neonatal intensive care unit (NICU) and newborns those mothers were seriously ill were excluded from the present study. Mothers of the newborn were considered as the sole respondent.

Sample size and Sampling Technique: The present study included all the newborns those met the inclusion criteria during the data collection period. Thus, a total 120 cases and another 120 controls with a 1:1 ratio were chosen for the study purpose.

Ethical Issues: The study was approved by the 'Institutional Ethics Committee' of the Bankura Sammilani Medical College, Bankura. Informed written consent was obtained from each of the respondents after explained the purpose and expected outcome of the study.

Methods of Data Collection: After obtaining informed consents from the respondents, a trained public health expert interviewed the mothers of the studied newborns. A pre-tested and pre-designed semi-structured questionnaire was used as the data collection tool. Apart from interview of the mothers, review of the mother and child protection card (MCPC) as well as bed head tickets, available medical records and reports were also used as the other technique for data collection. Information collected on selected socio-demographic, cultural and socio-economic characteristics of the mothers such as maternal age, area of residence, caste, religion, maternal occupation, maternal education, smoking history, birth spacing. Information also collected regarding maternal health and nutrition service related factors such as time of registration, frequencies of ante-natal check-ups (ANC), iron-folic acid (IFA) tablet consumption, extra major meal during pregnancy, attendance in nutrition and health education, supplementary nutrition under the ICDS scheme. Several maternal co-morbidities such as like anaemia, hypertension, diabetes mellitus, urinary tract infection during pregnancy were also enquired.

Data Entry and Analysis: After thorough verification, data were entered and analyzed by using the SPSS 20.0 software package (statistical package for social sciences). The categorical variables were expressed in terms of numbers and percentages. Multi-variate logistic regression analysis done to identify the independent risk factors of low birth weight after adjustment for possible confounders. Strength of association between risk factors and outcome (low-birth weight) were judged by calculating the odds ratio (OR) and their 95% confidence interval (CI). For all statistical purpose, $p < 0.05$ was considered as level of significance.

III. Result

A total 240 new born babies which comprised of 120 cases (low birth weight) and another 120 matching controls (not low birth weight) with 1: 1 ratio were evaluated in the present study.

The individual maternal socio-cultural profiles were illustrated in the Table 1. It was found from that muslim religion (OR-2.79), rural area of residence (OR-1.57), teenage pregnancy (OR-1.95), maternal occupation (OR-1.36), low maternal education (OR-1.41), primi-parity (OR-1.15) and inadequate birth spacing (OR-1.36) higher risk of low birth weight babies, but teenage pregnancy (OR:1.95; 95% CI: 1.15-3.30) was found to be a significant risk factor (OR:1.95; 95% CI:1.15-3.30).

The distribution of study population according to maternal health and nutrition service related factors were described in Table 2. It was found from this that delayed registration (OR-1.45), IFA tablet consumption <180 (OR-1.31), no extra major meal during pregnancy (OR-2.19), poor attendance in nutrition and health education session (OR-1.36), irregular consumption of supplementary feeding under ICDS (OR-1.30) , preterm delivery (OR- 5.68)increased the risk of low birth weight babies , but no extra major meal during pregnancy (OR:2.19; CI:1.30-3.67) and pre-term delivery (OR: 5.68; CI: 2.87-11.22)] were found to be significant risk factors for low birth weight babies. Table-3 shows distribution of study population according to co-morbidities of the mothers. It was found from this study that presence of maternal co-morbidities during pregnancy like anaemia (OR-1.79), hypertension (OR-1.60), diabetes mellitus (OR-2.56), recurrent UTI (OR-3.16) increased the risk of low birth weight babies, but none of them were found to be significant.

Table no 1: Distribution of study population according to individual maternal socio- cultural variable

Variables	Category	LBW(n=120)	Not LBW(n=120)	OR (95% CI)
Religion	Muslim	8(72.7)	3(27.3)	2.79(0.72-10.77)
	Hindu	112(48.9)	117(51.1)	
Caste	General	57(50.0)	57(50.0)	1.00(0.60-1.66)
	SC/ST/OBC	63(50.0)	63(50.0)	
Area of residence	Rural	110	110	1.57 (0.68-3.65)
	Urban	10	10	
Maternal age (in Years)	< 20	57(60.0)	38(40.0)	1.95(1.15-3.30)
	≥20	63(43.4)	82(56.6)	
Maternal occupation	Works outside	28(56.0)	22(44.0)	1.36(0.72-2.54)
	Housewife	92(48.4)	98(51.6)	

Maternal education	Up to primary ≥ Primary	43(55.8) 77(47.2)	34(44.2) 86(52.8)	1.41 (0.82-2.44)
Parity	Primiparous Multiparous	76(51.4) 44(47.8)	72(48.6) 48(52.2)	1.15 (0.68-1.93)
Birth Spacing	< 3 years ≥ 3 years	20(62.5) 24(40.0)	12(37.5) 36(60.0)	1.36(0.81-2.28)
History of Smoking	Yes No	29(47.5) 91(50.8)	32(52.5) 88(49.2)	0.88 (0.49-1.57)

LBW: Low birth weight, OR: Odds ratio, CI: Confidence Interval

Table no2: Distribution of study population according to maternal health and nutrition service related factors

Variables	Category	LBW(n=120)	Not LBW (n=120)	OR (95% CI)
Time of registration	>12weeks	60(55.0)	49(45.0)	1.45 (0.87-2.41)
	≥12 weeks	60(45.8)	71(54.2)	
Number of ANC	< 4	32(46.4)	37(53.6)	0.82(0.47-1.43)
	≥ 4	88(51.5)	83(48.5)	
IFA tablet consumption	< 180	60(53.6)	52(46.4)	1.31 (0.79-2.17)
	≥ 180	60(46.9)	68(53.1)	
Extra meal in pregnancy	No	66(60.6)	43(39.4)	2.19 (1.30-3.67)
	Yes	54(41.2)	77(58.8)	
Attendance in NHED	< 3	75(53.2)	66(46.8)	1.36 (0.81-2.28)
	≥3	45(45.5)	54(54.5)	
Taken SNP on regular basis	Yes	75(47.8)	82(52.2)	1.30(0.76-2.20)
	No	45(54.2)	38(45.8)	
Timing of labour onset	Pre-term	49(79.0)	13(21.0)	5.68(2.87-11.22)
	Term	71(39.9)	107(60.1)	

LBW: Low birth weight, OR: Odds ratio, CI: Confidence Interval, ANC: Ante-natal care, IFA: Iron folic acid, SNP: Supplementary nutrition programme, ICDS: Integrated child development service, NHED: Nutrition and health education day.

Table no 3: Distribution of study population according to co-morbidities of mothers

Maternal Co-morbidities	Category	LBW (n=120)	Not LBW(n=120)	OR (95% CI)
Anaemia	Yes	26(61.9)	16(38.1)	1.79(0.90-3.56)
	No	94(47.5)	104(52.5)	
Hypertension	Yes	33(58.9)	23(41.1)	1.60 (0.87-2.93)
	No	87(47.3)	97(52.7)	
Diabetes	Yes	5(71.4)	2(28.6)	2.56 (0.49-13.49)
	No	115(49.4)	118(50.6)	
Recurrent UTI	Yes	9(75.0)	3(25.0)	3.16(0.83-11.98)
	No	111(48.7)	117(51.3)	

LBW: Low birth weight, OR: Odds ratio, CI: Confidence Interval, UTI: Urinary tract infections

IV. Discussion

Low birth weight is one of the most serious challenge in maternal and child health in both developed and developing countries, its public health significance may be ascribed to numerous factors-its high incidence, its association with mental retardation and a high risk of peri-natal and infant mortality and morbidity, human wastage and suffering, very high cost of special care and intensive care unit and its association with socio-economic development. There is several type of risk factors may be associated with both preterm and small for date low birth weight infants. This study was conducted to assess the risk factors of low birth weight babies born in the Bankura Sammilani Medical College and Hospital, Bankura. Maternal socio-cultural variables like religion, caste, residence, maternal age, maternal occupation were important determinant of low birth weight. In this study, it was found that teenage pregnancy, maternal education, occupation, religion of mother increased risk to deliver Low birth weight babies (OR>1). Number of researchers stated that maternal socio-cultural factors like education, income, residence etc. were associated with particular health behaviour particularities and health status that further directly influenced the newborn's health including birth weight^{4,8,9,10}. Teenage pregnancy was a significant risk factor for low birth weight babies (OR:1.95;CI:1.5-3.30). Similar finding was observed by Dickute et al., where it was found that maternal age, low maternal education, poor socio- economic status and residence of mothers were important risk factors of low birth weight babies.⁸ In a matched pair case control study by Mumbare et al., it was found that birth spacing less than 36 months, poor socio-economic status were associated with delivery of low birth weight babies.

Maternal health and nutritional service related factors in pregnancy such as time of registration, number of antenatal check up, number of IFA tablet consumption, extra major meal taken and weight gain during pregnancy, attendance in nutrition and health education day (NHED) played a significant role for

causation of low birth weight babies. Except number of Ante-natal check up, all the factors increased the risk of Low birth weight babies. It was also found from this study that no extra major meal during pregnancy (OR:2.19; 95% CI: 1.30-3.67) , preterm delivery (OR:5.68; 95% CI: 2.87-11.22) were the significant risk factors for low birth weight babies. Mumbare et al. found in their pregnancy weight gain ≤ 6 kg, inadequate antenatal check up with delivery of low birth weight infants and conditional logistic regression analysis showed that significant risk factors associated with Low birth weight were inadequate antenatal check up (OR: 4.98 ; CI: 2.64-9.39)⁹. Maternal co-morbidities like anaemia, hypertension, diabetes, recurrent UTI are important risk factors for Low birth weight babies. In this study, presence of anaemia, hypertension, diabetes, recurrent UTI during pregnancy increased the risk of Low birth weight babies. Similar finding was observed in a matched pair case control study among low birth weight infants, where maternal anaemia and hypertension were associated with delivery of LBW infants.⁹ In a case-control study conducted in Dhulikel hospital, difference of maternal haemoglobin among cases controls were statistically significant ($p < 0.001$)¹¹.

V. Conclusion

In the present study, teenage pregnancy, no extra major meal taken during pregnancy and pre-term delivery were found independent risk factors of low birth weight babies which necessitates the needs for strengthening the maternal health and nutritional components. Low birth weight could be prevented by adopting primary levels of prevention in an integrated approach with active community participation. Improvement in female literacy, women empowerment and raising community awareness could be long term measures.

VI. Study limitations

The study was conducted in a hospital among small sample. So, it was not a representative sample of the parent population. Thus, the study results could not be generalised. A large community based study among representative sample could solve those problems.

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