



RISK FACTORS AND EARLY NEONATAL OUTCOMES ASSOCIATED WITH LOW BIRTH WEIGHT BABIES IN A DISTRICT HEAD QUARTER HOSPITAL OF ODISHA: A CASE CONTROL STUDY

Gastroenterology

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ABSTRACT

BACKGROUND: World Health Organization (WHO) has defined Low Birth Weight (LBW) as birth weight less than 2,500 grams irrespective of gestational age. Overall, it is estimated that 15% to 20% of all births worldwide are LBW, representing more than 20 million births a year. **OBJECTIVE** is to assess the socio-demographic and maternal risk factor associated with LBW babies. **METHOD:** A hospital based case controls study with 107 mothers of LBW babies as case and 214 mothers of normal weight babies as control who delivered at DHH Jagatsinghpur. **RESULT:** Rural area, working women, low SEC status, low BMI, associated chronic disease, anemia, less no of ANC check up etc were associated risk factor for LBW babies. Occurrence of hypothermia, hypoglycemia, refusal to feed, respiratory distress, neonatal sepsis etc. early neonatal complications were more in LBW babies as compared to babies having normal birth weight.

KEYWORDS

Low birth weight, risk factors, case-control study

INTRODUCTION:

World Health Organization (WHO) has defined Low Birth Weight (LBW) as birth weight less than 2,500 grams irrespective of gestational age. This cut off is based on the epidemiological observations that the infant weighing less than 2500 grams are approximately 20 times more likely to die than normal weight babies.¹ In countries where the population of low birth weight is less, short gestation period that is preterm, is a major cause and in countries where proportion of LBW is high like in India, majority LBW are due to intra uterine growth retardation.²

Overall, it is estimated that 15% to 20% of all births worldwide are LBW, representing more than 20 million births a year.³ Regional estimates of LBW include 28% in south Asia, 13% in sub-Saharan Africa and 9% in Latin America. Majority of these are born in low and middle income countries such as South East Asia (28%) and Sub-Saharan Africa (13%) due to poor socioeconomic status, poor accessibility to health care, multiple pregnancy, risk of infections etc.⁴ Out of these, LBW babies of the developing countries, nearly 40% are born in India.⁵

MATERIALS AND METHODS:

The present study is a hospital based unmatched case control study with case: control = 1:2. that is 107 cases and 214 controls were taken totaling to 312 study participants. The study was conducted in the obstetrics and Gynecology Dept. and SNCU of District Head quarter Hospital of Jagatsinghpur. The present study was undertaken for a period of 1 year i.e. from October 2019 to September 2020. The cases are mothers and babies delivered at DHH, Jagatsinghpur during the study period, excluding extremely low birth weight babies i.e. less than 1 kg and their mothers, Critically ill babies needing ventilator support and referred, Critically ill mothers, Pt. referred to higher centre during early neonatal period and Mothers who did not give the consent.

Sample size i.e 107 cases was calculated, $Z_{\alpha/2} = 1.96$ (with 95% C.I), $Z_{\alpha} = 0.84$ (Taking power as 80%), Control: case = 2:1 ($\alpha = 2$). A pre-designed, pre-tested, semi-structured questionnaire was prepared to collect data.

Data Collection:

After taking the ethical clearance from IEC of SCB MCH, Cuttack. As per the sample size calculated, a total of 107 cases & 214 controls, data was collected over a period of 6 month by visiting the O & G Dept. and SNCU of D.H.H twice weekly. For each case selected two controls were taken randomly.

Operational definition:

Case: Mothers and baby of birth weight less than 2.5 kg (but more than 1 kg) irrespective of gestational age, delivered at DHH Jagatsinghpur during the study period.

Control: Mothers and baby of birth weight more than 2.5 kg delivered at DHH Jagatsinghpur during the study period.

OBSERVATION & DISCUSSION:

The study was a hospital based unmatched case control study conducted in the postnatal wards and SNCU of DHH Jagatsinghpur involving 321 newborns out of which 107 newborns were Cases i.e Low Birth Weight (below 2500grams) and 214 were control i.e. Normal Birth Weight (≥ 2500 gms).

The mean maternal age among cases was found to be (23.8 ± 7.4) yrs and in control it was (26.4 ± 5.6) yrs. Among controls maximum 83.64% were among 20-30 years age group. In a study by Bhue PK et al. most of the mothers of low birth weight baby were illiterate.⁷ Majority from both cases and controls were educated up to secondary and above secondary level. 66.35 % of mother's of LBW babies were working and 33.64% were house wives. Mean age of marriage in cases was (23.63 ± 2.8) years and in controls it was (22.54 ± 3.2) years which were near similar.

The place of residence of study participants with maximum (78.5%) of LBW babies were from rural area. Among normal birth weight babies (64.48%) were from urban area. Majority (57%) of LBW Babies were from joint family.

Maximum of the family of both LBW and NBW babies belongs to upper middle class and upper class. Among family of LBW, Upper class families were 51.4% and Mean Per capita income of family in

Cases were Rs. (8490.65±5365.01) and Rs. (10373.36±7989.22) in Control groups.

The mean birth weight among LBW babies was 2.102±0.25 kg and among NBW babies it was found to be 3.05±0.43kg. The mean baby length was found to be 49.05±1.34cm among LBW babies which is similar to NBW babies.

Most of the LBW babies are female i.e 55.14% but among controls maximum were males i.e 62.61%.

Mean height of mother of LBW babies was found to be 1.55±0.08 mtrs which was slightly lower than the mothers of NBW i.e. 1.57±0.05 mtrs. The mean weight of mother at the time of registration of pregnancy was found to be near similar i.e 51.13±9.04 kg and 51.65± 6.71 kg among mothers of LBW and NBW babies respectively. Maximum (46.72%) of LBW babies mothers were underweight.

Among all mothers of LBW babies about 33.64% had normal haemoglobin level. About 31.77% of mothers of LBW babies had any chronic disease like hypertension, thyroid disease and maximum mothers of NBW babies (80.37%) had no chronic disease.

About 49.53% of mothers of LBW had < 4 ANC whereas majority (73.83%) of the mothers of normal birth weight babies had ≥4 ANC. A study by Acharya D et al. also shows that less ANC associated with low birth weight babies⁵.

Only 2.8% of mothers having LBW babies had got the supplementary nutrition. 83.17% of mothers bearing LBW babies got properly wormed and about 16.82% did not.

52.33% of LBW babies developed complications in contrast to 28% of NBW babies and 50% of LBW babies were admitted at SNCU.

Out of all LBW babies maximum had early neonatal complication of refusal to feed for which they were admitted to SNCU. Hypothermia (19.62%), hypoglycemia in 12.14%, sepsis (9.34%), apnea (4.6%), and some others (4.6%) complications were also found in LBW babies.

Table 1: Association of socio-demographic factors of mother with birth weight of babies

Variable	Cases (N=107) Number %	Controls (N=214) Number %	T value/ x ² value	P value
Maternal Age (Mean±SD) in years	23.8± 7.4 yrs	26.4± 5.6 yrs	- 3.0	<0.001
Maternal age in group	<20 yrs	8(40%)	12(60%)	
	20-30 yrs	97(35.1%)	179(64.9%)	
	>30yrs	2(8%)	23(92%)	
Mother's education	Illiterate	15(51%)	14(48.3%)	x ² =16.5 90
	Primary	3(13.6%)	19(86.4%)	
	Secondary	33(24.6%)	101(75.4%)	
	More than 10	56(41.2%)	80(58.4%)	
Mother's occupation	Working	71(51.1%)	68(48.9%)	x ² =34.7 4
	House wife	36(19.8%)	146(80.2)	
Age at marriage (in years)	23.6355±2.859	22.5421±3.20	t=2.983	0.003

Mean maternal age among mothers of normal birth weight babies is 26.4± 5.6 years which is slightly higher as compared to the mothers of LBW babies i.e. 23.8±7.4 years which is statistically significant with p value of <0.0001. A significant association between the maternal age and occurrence of LBW was found. In the age group of 20-30 years mothers had more chance of normal birth weight baby.

Working women had more chance to deliver a low birth weight baby as compared to house wife which was statistically significant (p<0.05)

Table 2: Association of Socio-demographic profile of family and LBW

Variable	Cases(N=107) LBW	Controls (N=214) NBW	T value/ x ² value	P value
Residence	Rural	84(52.5%)	76(47.5%)	x ² =52.73
	Urban	23(14.3%)	138(85.7%)	
Family type	Nuclear	46(23%)	154(77%)	x ² =25.494
	Joint	61(50.4%)	60(49.6%)	

Majority of women living in rural settings(52.5%) gave birth to LBW babies as compared to those of urban, which is statistically significant with p value=0.001.

Occurrence of LBW was more in joint family as compare to nuclear family with a significant p value<0.05.

Table 3: Association of Socio Economic Status of the study participants and birth weight of babies

Variable	Cases (N=107) LBW	Controls (N=214) NBW	T value/ x ² value	P value
Per-capita family income (Mean±SD) in Rs.	8490.65± 5365.01	10373.36± 7989.22	t=-2.210	0.01
Socio-economic status	lower class	0	x ² =17.666	0.001
	Lower middle class	8(88.9%)		
	Middle class	19(36.5%)		
	Upper middle class	25(23%)		
	Upper class	55(35.7%)		

With increasing socio economic status chance of being LBW decreased which was found to be statistically significant.

A significant association is found between the mean per-capita income of the family and occurrence of LBW with a p value =0.01. Family with high per-capita income had less chance to deliver LBW.

Table 4: Association of Demographic and anthropometric profile of baby with Birth Weight of babies

Variable	Cases (N=107) LBW	Controls (N=214) NBW	T value/ x ² value	P value
Babyweight (Mean±SD) in kg	2.1023±0.25kg	3.05± 0.434 kg	t=-20.930	0.000
Baby gender	Male	48(26.4%)	134(73.6%)	x ² =9.161
	Female	59(42.4%)	80(57.6%)	

In 55.6% cases that the baby was of low birth weight, when the birth interval was < 3 years, whereas occurrence of LBW babies becomes as low as 17.6% if the birth interval becomes ≥ 3 years, results being statistically significant p<0.001.

Table 5: Association of Anthropometric profile, obstetrics profile of mothers and LBW

Variable	Cases (N=107) LBW	Controls (N=214) NBW	T value/ x ² value	P value
Height (Mean ±SD)	1.55±0.081	1.57±0.05	t=-0.2861	0.001
Weight at registration	51.13±9.04	51.65±6.71	t=0.584	0.560
BMI group	Under-weight	50(43.9%)	64(56.1%)	12.196
	normal weight	42(31.8%)	90(68.2%)	
	over-weight	11(18.3%)	49(81.7%)	
	obese	4(26.7%)	11(73.3%)	
Pregnancy wt. Gain	5.99±2.11kg	6.99±2.21kg	t=-3.882	0.001

As the BMI increases, the occurrence of LBW babies decreases and the result was statistically significant with p value of 0.007.

There is no significant difference in the weight of mothers between cases controls measured at the time of registration.

From the table mean weight gain during pregnancy was seen more in mothers of normal birth weight baby as compared to mothers of LBW babies which was statistically significant.

Table-6: Association of birth weight of baby with present medical illness of mother

Variable	Cases (N=107) LBW	Controls (N=214) NBW	T value/ x ² value	P value
Anemia	No anemia	36(23.2%)	119(76.8%)	x ² =51.673
	Mild anemia	24(24.2%)	75(75.81%)	
	Moderate anemia	47(70.1%)	20(29.9%)	

Any chronic disease	Yes	34(44.7%)	42(55.3%)	$\chi^2=5.827$	0.016
	No	73(29.8%)	172(70.2%)		
Any obstetrics complication	Yes	68(63.6%)	39(36.4%)	$\chi^2=65.951$	<0.001
	No	39(18.2)	175(81.8%)		

As the severity of anemia increased, the number of LBW babies significantly increased with $p < 0.001$. similar findings were reported by Bharkar R K et al. Prevalence of LBW was more among mothers with chronic disease like HTN, thyroid disease, any cardiovascular disease etc.⁶

There was a significant association between LBW and obstetrics complication of mothers in entire course of her pregnancy with a p value of <0.001.

Table 7: Association of ANC check-up, supplementary medication and food with LBW

Variable		Cases (N=107) LBW	Controls (N=214) NBW	T value/ χ^2 value	P value
Total no of ANC	<4	53(48.6%)	56(51.4%)	17.364	<0.001
	≥4	54(25.5%)	158(74.5%)		
IFA and calcium supplementation	<180 days	12(41.4%)	17(58.6%)	6.057	0.335
	≥180 days	95(32.5%)	197(67.5%)		
Supplementary Nutrition	No	3(100%)	0	6.057	0.014
	Yes	104(32.7%)	214(67.3%)		
De-worming	No	18(36.7%)	31(63.3%)	0.301	0.583
	Yes	89(32.7%)	183(67.3%)		

A significant association between number of total ANC and occurrence of LBW was found in the study.

Table 8: Association of utilization of Govt. health programme by study participants and Birth Weight

Variable		Cases (N=107) LBW	Controls (N=214) NBW	T value/ χ^2 value	P value
Mamata incentive	No	12(19.7%)	49(80.3%)	6.325	0.012
	Yes	95(36.5%)	165(63.5%)		
PMSMA	Not attend	51(38.9%)	80(61.1%)	3.121	0.07
	Attend	56(29.5%)	134(70.5%)		
VHND	Not Attend	51(44%)	65(56%)	9.240	0.002
	Attend	56(27%)	149(72%)		
Transport facility	Self	48(40.7%)	70(59.3%)	9.047	0.01
	102	43(34.7%)	81(65.3%)		
	108	16(20.3%)	63(79.7%)		
Accompanied by ASHA	No	39(70.9%)	16(29.1%)	42.171	<0.001
	Yes	68(25.6%)	198(74.4%)		

A significantly higher percentage of normal birth weight babies were observed amongst mothers who did not receive "mamata incentive", results being statistically significant.

No significant difference was observed among mothers who did and who didn't attend the monthly PMSMA sessions.

Amongst mothers who attended regular VHND sessions, only 27% had low birth weight babies and rest all of them had babies with normal weight. This was statistically significant with $p = 0.002$.

Among the mothers who were not accompanied by ASHA to their delivery centre, 70.9% of them delivered a LBW baby, results being statistically significant at $p < 0.001$.

Table 9: Association of Neonatal out comes with Low birth weight of baby

Variable		Healthy baby	Baby with complication	T value/ χ^2 value	P value
Early neonatal out comes	LBW	51(47.7%)	56(52.3%)	17.490	<0.001
	NBW	153(71.5%)	61(28.5%)		
Variable		SNCU	O&GWARD	T value/ χ^2 value	P value

Early neonatal out comes	LBW	54(50.5%)	53(49.5%)	15.670	<0.001
	NBW	60(28%)	154(72%)		

A significant association was found between the stay of neonate in O&G ward or SNCU with LBW.

In our study more of the LBW babies developed early neonatal complication and more of NBW babies were healthy (71.5%) and stay at O&G ward with the mothers and this out comes were statistically significant.

Table 10: Association of Early neonatal complications with birth weight of babies

Variable		Cases LBW	Controls NBW	T value/ χ^2 value	P value
Early neonatal complications	Hypothermia	21(51.2%)	20(48.8%)	$\chi^2 = 6.76$	0.009
	Hypoglycemia	13(100%)	0	27.09	0.000
	Neonatal jaundice	6(16.2%)	31(83.8%)	5.514	<0.01
	Refusal to feed	38(97.4%)	1(2.6%)	82.08	<0.001
	Respiratory distress	10(83.3%)	2(16.7%)	14.02	<0.001
	Prematurity	9(100%)	0		
	Apnea	5(83.3%)	1(16.7%)	6.879	0.009
	Sepsis	10(100%)	0	20.643	0.000
	Others	5(83.3%)	1(16.7)	6.87	0.05

From the above table it was found that occurrence of hypothermia, hypoglycemia, refusal to feed, respiratory distress & sepsis were more in LBW babies and Neonatal jaundice is more in NBW babies and this result was statistically significant.

SUMMARY & CONCLUSION:

Majority of the mother of LBW babies (90.65%) and majority of mothers of controls (83.64%) were in age group of 20 to 30 years, working and from rural areas which were found to be significantly associated with LBW. With increase in severity of anemia occurrence of LBW increased which was statistically significant. A significant association was observed between antenatal check up and low birth weight baby.

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