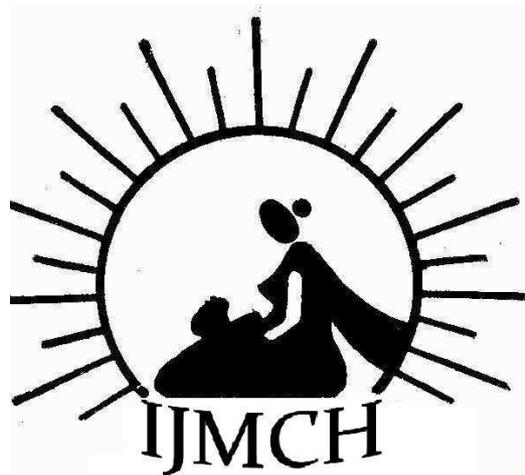


**RISK FACTORS FOR LOW BIRTH WEIGHT:
A CASE CONTROL STUDY IN LUDHIANA, PUNJAB**

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**RISK FACTORS FOR LOW BIRTH WEIGHT :
A CASE CONTROL STUDY IN LUDHIANA, PUNJAB**

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ABSTRACT

BACKGROUND: Half of all perinatal and one third of all infant deaths are directly or indirectly related to LBW, making it an important target for public health interventions, which entails a clear understanding of the multi-factorial origins of LBW. It is, therefore, considered a crucial area for epidemiological investigations.

OBJECTIVES: To identify significant risk factors for LBW in women delivering in a teaching hospital with a view to suggest ways to minimize the incidence of LBW in this population.

METHOD: Case control study. 50 cases (LBW newborns) and 100 controls (normal birth weight newborns) born in Christian Medical College Hospital, Ludhiana, were studied. The data was analyzed in Epi-Info software. Statistical analysis included the exposure rates in percentages for the risk factors under study, the Odd's Ratio and its 95% Confidence Interval. Multivariate analysis was also carried out, using SPSS software, to assess the association of LBW with individual risk factors while controlling for the others.

RESULTS: Primi parity, prematurity, antenatal complications and maternal weight gain < 10 Kg during the pregnancy were found to be significant risk factors for LBW. Multivariate analysis reinforced these findings while markedly strengthening the association of primiparity with LBW and also identifying maternal height < 155 cms as a significant risk factor for LBW.

CONCLUSIONS: The study underscores the need for improving maternal nutritional and providing better antenatal care by implementing the risk approach, particularly in the primigravida.

KEY WORDS : *Low birth weight, risk factors, case control study.*

INTRODUCTION

Birth weight is one of the most important criteria for determining neonatal and infant survival and is considered a sensitive index of the nation's health and development. The World Health Organization (WHO) defines low birth weight (LBW) as "Birth weight less than 2500 grams" regardless of gestational age, the measurement being taken preferably within the first hour of life.(1)

Globally, the WHO estimates that 25 million LBW babies are born each year, consisting of 17 % of all live births, nearly 95 % of them in developing countries(2). The weight of an infant at birth, besides being an important determinant of the infant's further growth and development, also broadly reflects the level of nutrition of a community.(3).

In India 26% of all live births are LBW(4). Half of all perinatal and one third of all infant deaths are directly or indirectly related to LBW. It is, therefore, considered a crucial area for clinical and epidemiological investigations and a target for public health interventions. This entails a clear understanding of the multi-factorial origins of LBW in India, in which social and economic factors play a significant role.

As you enter the state of Punjab, on the Grand Trunk Road coming from Ambala district in Haryana, a signboard greets you saying, "**Welcome to the Granary of India,**" yet, the report of the Punjab State Health Department puts the proportion of LBW babies at 20.4% for the year 1991.(5)

LBW is one of the most serious challenges 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 high risk of perinatal and infant mortality and morbidity; human wastage and suffering; the very high cost of special care and intensive care units and its association with socio-economic under development.

There are two main groups of LBW babies: those born prematurely and those with intra-uterine foetal growth retardation. In India, the majority of cases can be attributed to intra-uterine foetal growth retardation(6).

During the past three decades several intervention programmes, including Child Survival and Safe Motherhood programme (CSSM) and Reproductive and Child Health Programme (RCH), have been launched in the state to improve the health status of mothers and children. It was in this context that the present study was designed, to identify significant risk factors for LBW in women delivering in a tertiary care teaching hospital in Punjab.

MATERIALS AND METHOD

Setting : Christian Medical College and Hospital, Ludhiana, Punjab.

Study design : Case control study.

Sample size : 50 cases (LBW newborns) and 100 controls (newborns with birth weight 2500 gm or more)

Method:

All the newborns delivered during the study period July – August 2004 were weighed immediately after birth with the help of an infant weighing scale. The first 50 LBW babies

were taken as cases, and 100 normal weight babies were taken as controls. Their mothers' hospital records as well as interview with them were used to obtain the required information on pre-tested questionnaire. Detailed information was collected on various pre-pregnancy and gestational factors like maternal age, education, per capita family income per month, the parity, the gestation at birth, spacing (for the second or higher birth order), significant maternal illness, past obstetrical history, antenatal complications in present pregnancy, maternal haemoglobin at birth along with birth weight of the newborn was collected. Maternal haemoglobin level of <11 gm/dl was taken as anaemia, according to WHO criteria (7). The Socio-economic classification was as per Modified Prasad's Method.(8). The information so obtained was analyzed by Epi-Info version-6 software (9). Multivariate analysis was carried out using SPSS software. The statistical analysis included proportions, Chi-square test, the exposure rates for the various risk factors under study in the cases and the controls, the Odds' Ratio and its 95% confidence intervals.

RESULTS

Table-1: Amongst the LBW babies, the highest proportion of the mothers were below 26 years of age (58.0 %), followed by the 26-30 years old (34.0 %) and the over 30 years old (8.0 %), whereas these age-group constituted 41.0 %, 39.0 % and 20.0 % in the mothers who had normal weight babies. However, the differences were statistically not significant. No significant association could be established between LBW and maternal education and socio-economic status as the distribution of these risk factors under study was more or less similar amongst the cases and the controls.

The most commonly reported factors of significance in the past obstetrical history were LBW, LSCS, anaemia and stillbirths. The past maternal illness of significance reported included Diabetes mellitus, hypertension, and pulmonary tuberculosis. The common antenatal complications in present pregnancy reported included PID, anaemia, IUGR and bleeding *per vaginam*.

Table-2 : The proportion of primi-parous women amongst the LBW babies (48.0 %) was significantly higher than in the women with normal weight babies (30.0 %), with Odds Ratio of 2.15 (CI 1.07 – 4.34). Prematurity, antenatal complications and maternal weight gain of ≤ 10 Kg were observed to be highly significant risk factors for LBW. The association between LBW and spacing, bad obstetric history, maternal height and maternal anaemia were not found to be statistically significant on univariate analysis.

RESULTS**Table-1 : Relationship of LBW with Maternal Age, Education and Economic Status**

A. Maternal Age	Cases (LBW +) n = 50		Controls (LBW –) n = 100		Total	Chi square Test
	No.	%	No.	%		
< 20 years	3	06.0	4	04.0	7	$\chi^2 = 5.29, df = 3, p = 0.15$
21- 25 years	26	52.0	37	37.0	63	
26-30 years	17	34.0	39	39.0	56	
> 30 years	4	08.0	20	20.0	24	
B. Maternal Education						
Illiterate	2	04.0	1	01.0	3	$\chi^2 = 2.82, df = 3, p = 0.42$
Primary	4	08.0	6	06.0	10	
Secondary	24	48.0	42	42.0	66	
Higher	20	40.0	51	51.0	71	
C. Maternal Economic status (Family Income per capita per month)						
Class I (> Rs 2550)	8	16.0	22	22.0	30	$\chi^2 = 3.19, df = 3, p = 0.36$
Class II (Rs 1274-2549)	23	46.0	53	53.0	76	
Class III (Rs 764-1273)	13	26.0	19	19.0	32	
Class IV (Rs 382 –763)	06	12.0	06	06.0	12	
Class V (< Rs 382)	00	-	00	-	00	

Multiple logistic regression analysis corroborated the univariate analysis findings of primiparity, prematurity, antenatal complications and maternal weight gain of \leq 10 Kg during the pregnancy as significant independent risk factors for LBW, while controlling for the other factors under study. Maternal height of < 155 cms was also identified as a significant independent risk factor for LBW.(Table 3)

Table 2 : Obstetric Risk Factors for LBW

Risk Factor Under Study	Cases (n=50) LBW +		Controls (n=100) LBW -		Total	Odds ratio (95% CI)
	No.	%	No.	%		
A. Mother's Parity						
Primiparous	24	48.0	30	30.0	54	2.15 (1.07 - 4.34)
Multiparous	26	52.0	70	70.0	96	
B. Gestational Age (Weeks)						
Pre-term (< 37 wks)	20	40.0	03	03.0	23	21.56 (5.99 - 99.77)
Term (37 wks or more)	30	60.0	97	97.0	127	
C. Spacing in months {Primiparous women have been excluded, n= 96}						
=/< 24 months	15	57.7	40	57.1	55	1.02 (0.38 - 2.80)
> 24 months	11	42.3	30	42.9	41	
D. Antenatal Complications						
Yes	45	90.0	48	48.0	93	9.75 (3.57 - 26.60)
No	5	10.0	52	52.0	57	
E. Maternal Weight Gain (in Kg)						
=/<10	40	80.0	30	30.0	70	9.33 (4.13 - 21.07)
> 10	10	20.0	70	70.0	80	
F. Bad Obstetric History						
Present	24	48.0	43	43.0	67	1.22 (0.62 - 2.42)
Absent	26	52.0	57	57.0	83	
G. Maternal Height (cms)						
< 155	8	16.0	12	12.0	20	1.40 (0.51- 3.69)
=/> 155	42	84.0	88	88.0	130	
H. Maternal Hb						
Hb < 11 gm %	34	68.0	53	53.0	87	1.88 (0.92 - 3.84)
Hb = 11 or more gm %	16	32.0	47	47.0	63	
I. Significant Maternal Illness						
Yes	6	12.0	12	12.0		1.00 (0.35 – 2.84)
No	44	88.0	88	88.0		

Table 3 : Multivariate Analysis for Obstetric Risk Factors for LBW

Risk Factor Under Study	OR	95 % CI of OR	
		Lower	Upper
Primiparity	6.35	1.163	34.702
Prematurity (Gestation <37 wks)	19.096	4.775	76.366
Antenatal Complications (+)	11.442	2.879	45.472
Maternal Wt. Gain (=/ <10 Kg)	5.923	2.090	16.786
Bad Obstetric History	2.861	0.539	15.172
Maternal Height (< 155 cms)	3.952	1.012	15.430
Maternal Hb (Hb < 11 gm %)	0.907	0.301	2.727

DISCUSSION

Our findings of the younger maternal age being a possible risk factor for LBW are in agreement with those of Joshi & Pal(10). who found 47.0% LBW in teenage pregnancies and an improvement of birth weight with increasing maternal age. Other reporters (11 12) also found lower birth weights with decreasing maternal age, though statistically no significant relationship was found in any of the studies. Other investigators (10 11)have found mean birth weight of babies to be lowest in illiterate women. Joshi & Pail (10)., Anand & Garg (11), and Mavalankar *et al* (13). have found an inverse relationship between socio-economic

status and LBW, with the latter decreasing with increasing socio-economic status. Our study does not show any statistically significant association between LBW and either maternal education or socio-economic status.

Our study identifies primiparity, prematurity, antenatal complications and maternal weight gain of \leq 10 Kg during the pregnancy to be highly significant risk factors for LBW. These findings are in agreement with those of other investigators : Anand & Garg (11) reported that first-born infants weighed less than babies born later. Srikrishna & Stephen(12) also observed that 94.80% women with more than 259 days of gestational age had normal weight babies. They also found that out of women who gained more than 12 kg during pregnancy, 90.9% delivered normal weight babies.

Improved maternal health, nutritional status and knowledge of child rearing, as a consequence of prolonged birth spacing, provides the second child a greater chance of survival (14). The role of severe anaemia in prematurity with LBW is well established (15). Idris Zafar Mohammed *et al* (16) observed that abnormal birth during previous pregnancy was associated with LBW deliveries. However, our study did not establish a statistically significant association between LBW and factors like birth spacing, maternal anaemia, and bad obstetric history.

CONCLUSIONS AND RECOMMENDATIONS

The present study demonstrates primiparity, prematurity, maternal weight gain \leq 10 Kg, the presence of antenatal complications and maternal height < 155 cms to be significant risk factors for LBW in the study population. The study emphasizes the need for good antenatal care in combating the problem of LBW. There is need for improving the nutritional and educational status of the girl child. We need sustainable practices to improve women's nutritional status during childhood, adolescence and prior to pregnancy, and to ensure their adequate weight gain during pregnancy, which require behaviour change within households. The primigravida are identified as a particular "at risk" group for LBW, and require more care and focussed attention for antenatal care. Training of community level health workers on prevention and diagnosis of LBW may go a long way to reduce the incidence of LBW.

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REFERENCES

1. World Health Organisation : International classification of diseases; tenth revision (1993), Vol. 2.
2. United Nations Development Program : Human development report (2002). Deepening democracy in a fragmented world.
3. Belsey NA : Global Overview of Newborn Health. *International Child Health* 1993; 4 : 13-32.
4. World Health Organisation : Bridging the gaps. The world health report, 1995, Report of the Director General.
5. Punjab Health Profile : Dept. of Health and Family Welfare, Govt. of Punjab. 1994-95, Chandigarh.
6. World Health Organisation : WHO Chronicle. 1978; 32 : 231.
7. World Health Organisation : Tech. Rep. Ser. No. 405, 1968
8. Kumar P : Social classification – Need for constant updating. *Indian Journal of Community Medicine*. 1993; 18 (2) : 60-61.
9. Dean AG, Dean GA, Coulombier D, Brendel KA, Smith DC *et al.* : EpiInfo, version 6 : a word processing, database and statistics program for Epidemiology on microcomputers. *Centers for Disease Control and Prevention, Atlanta, Georgia, U.S.A* (1994)
10. Joshi M Sumedha and Pai NP : Effect of the maternal bio-social determinants on the birth weight in a slum area of greater Mumbai. *Indian Journal of Community Medicine*. 2000; 25 (3) : 121-123.
11. Anand Kiran and Garg BS : A study of factors affecting LBW. *Indian Journal of Community Medicine*. 2000; 25 (2) : 57-62.
12. Srikrishna SR and Stephen Chitra : Birth weights in a Bangalore Hospital. Is the city woman in the phase of nutrition transition? *Health and Population – Perspectives and Issues*. 2003; 26 (2) : 74-86.
13. Mavalanker DV, Gray RH, Trivedi CR : Risk factors for pre-term and term low birth weight in Ahmedabad. *International Journal of Epidemiology*. 1992; 21 (2) : 263 - 272.
14. Vijaykumar K : Birth spacing and its bearing on birth weight. *Indian Journal of Community Medicine*. 1992; 17 (1) : 15-20
15. Annotations. *Effect of Birth Weight : a major determinant of child survival*. Extracted from *Future* 1986; 127 : 53-7. In : *Indian Journal of Pediatrics*, 1987; 801-818.
16. Mohammad Zafar Idris, Anuradha Gupta, Uday Mohan, Anand Kumar Srivastava, Vinita Das : Maternal health and low birth weight among institutional deliveries. *Indian Journal of Community Medicine*. 2000; 25 (4) : 156-160.