ORIGINAL ARTICLE

Epidemiological Factors Affecting Low Birth Weight

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Abstract

The present study was conducted to determine the epidemiological factors influencing low birth weight. The prominent factors associated with low birth weight (LBW) such as maternal age, parity, obstetric and maternal anthropometry were studied in a rural community of district Dehradun. The average birth weight of all newborns was 2.67± 0.42 kg and 23.84% of newborns were LBW. The factors which were significant for LBW were antenatal care, parity, inter-pregnancy interval, gestational weight, and bad obstetric history. However, the relationship between maternal age and height with low birth weight was not found to be statistically significant ($p>.05$).

Key Words : Low birth weight; Parity; Inter pregnancy interval

Introduction

Birth weight is a reliable index of intra uterine growth retardation (IUGR) and a major factor determining child survival, future physical growth and mental development (1). A multifactorial inter-relationship exists between the environment in which pregnant mothers live and the growth of the fetus (2). This relationship has prompted public health personnel to suggest that birth weight distribution and the proportion of babies born with a low birth weight (LBW) be considered as indicators of socio economic development. LBW is found to be one of the major causes of high mortality and morbidity rates (3). Worldwide, out of 139 million live births, about 23 million infants had low birth weight i.e., birth weight less than 2.5 kg (4). In India, the prevalence of LBW infants is about 33% (5), as compared to 4.5% in industrially developed countries (6). The perinatal mortality among LBW infants is about 8 times higher than that in infants weighing more than 2.5kg (7).

Among the factors that were identified by Kraemer (8) as possible determinants of LBW, maternal factors, socio economic status, calorie intake, urinary tract infection and quality of antenatal care were listed as prominent factors. The purpose of this study is to identify the epidemiological factors affecting birth weight and also to know the relationship of socio economic, obstetric and anthropometric factors of mother with LBW.

Material and Methods

The present study was carried out at Rural Health Training Centre (RHTC), the field practice area of the department of Community Medicine and the Obstetric and Gynaecology wards of the Himalayan Institute of Medical Sciences, Dehradun during the period from March 2003 to February 2004. A longitudinal study design was employed for pregnant women who were registered at RHTC and visited regularly for antenatal checkups and finally for their delivery either at RHTC or Institute Hospital. All pregnant women (172) coming to RHTC clinic and registered for regular antenatal checkups were considered as study subjects. A complete per abdomen examination, clinical profile along with anthropometric measurements, B.P., blood and urine examination were undertaken. After birth, each newborn's weight was taken

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immediately. Data on maternal age, education, occupation and parity along with clinical profile and investigation was recorded on pre designed and pre-tested proforma. Chi-square test and odds ratio were used in the statistical analysis.

Results

RHTC caters to a population of 11,278 and the prevailing antinatal registration rate at RHTC was found to be 82.2%. The incidence of LBW was 23.8%, while the mean birth weight of all 172 newborns was 2.67 Kg (with SD ± 0.42 kg). It is to be noted that there was no new born with birth weight less than 1.5 Kg and only 5% new borns were with birth weight more than 3.4 Kg (Table 1).

Table 1.

Distribution of new borns according to birth weight

Birth Weight (Kgs)	No. of New borns	%	Mean	S.D.
1.5 - 2.4	41	23.8	2.22	±0.24
2.5 - 3.4	122	71.0	2.76	±0.32
=3.5	9	5.2	3.56	±0.18
Total	172	100.0	2.67	±0..42

Table 2 reveals that out of all registered mothers, outcome was better in mothers who got registered for regular antenatal checkup in the first trimester. Similarly the birth weight of newborns was influenced significantly by the number of antenatal visits made by the mother ($p < .01$). Mothers with one antenatal visit had almost six times higher risk of having a LBW baby in comparison to mothers who had 5 or more antenatal visits (odds ratio is 5.71).

Table 2

Distribution of LBW babies according to antenatal care (n=172)

Antenatal care	Level	No. of new borns	LBW		Odds Ratio	p value
			No	%		
Registrations at	I trimester	33	6	18.2	1.24	
	II trimester	74	16	21.6	1.50	
	III trimester	65	19	29.2	1.86	p<0.05
ANC visits	<2	12	5	41.7	5.71	
	2-4	97	29	29.9	3.41	
	>5	63	7	11.1	1.00	p<0.01

Table 3 shows that the more number of LBW babies (36%) were born to mothers who were less than 20 years of age. The relationship between maternal age and LBW was not found to be statistically significant ($p > .05$). The risk of delivering LBW babies is almost twice among the mothers who were aged below 20 years and who were aged 30 years and above.

Table 3.

Distribution of LBW babies according to maternal age (n=172)

Maternal age (yrs)	No. of new borns	LBW		Odds Ratio	P Value
		No.	%		
<20	22	8	36.4	1.74	P>0.05
20-25	85	21	24.7	1.00	
26-30	52	10	19.2	1.38	
31-35	13	2	15.4	1.80	

Table 4 depicts that the LBW rate was high for parity i.e. 38.6% when compared to parity two (16.4%) and parity three and above (10.6%). The association was found to be highly significant ($p<.01$). The odds ratio for parity one and two was 3.21, which indicates that parity one has three times the risk of delivering LBW babies compared with mothers with parity two or more. The association between inter-pregnancy interval and low birth weight was found to be significant ($p<.05$). The interval vetween two successive pregnancies (in months) is defined as inter-pregnancy interval. The highest rate (34.5%) of LBW babies belonged to mothers whose inter-pregnancy interval was less than 12 months. The odds ratio was 2.58 (Table 5). As regards maternal height, 29.1% mothers with height less than 150 cm delivered LBW babies when compared to 19.4% mothers with height = 150 cm, who delivered LBW babies. This was not significant ($p>.05$). The odds ratio was 1.71 (Table 6).

Table 4

Relationship between parity and LBW (n=172)

Parity	No. of new borns	LBW		Odds Ratio	P Value
		No.	%		
1	70	27	38.6	3.21	P<0.01
2	55	9	16.4	1.00	
=3	47	5	10.6	1.64	

Table 5

Relationship between LBW and interpregnancy interval (n=172)

Inter pregnancy interval	No. of new borns	LBW		Odds Ratio	P Value
		No.	%		
<12	58	20	34.5	2.58	P<0.05
12-47	94	16	17.0	1.63	
=48	20	5	25.0	1.78	

Table 6

Distribution of LBW babies according to Bad Obstetric History (n=172)

Inter pregnancy interval	No. of new borns	LBW		Odds Ratio	P Value
		No.	%		
Abortion	22	12	54.5	7.35	P<0.01
Still Birth	10	5	50.0	5.88	P<0.01
Perinatal death	13	7	53.8	10.29	P<0.01
Premature delivery	14	5	35.7	8.82	P<0.05
Breech delivery	5	1	20.0	5.88	
No BOH	108	11	10.2	1.00	

Table 7 depicts that the maximum number of LBW babies (47.7%) were delivered by mothers whose gestational weight at third trimester was < 45 Kg (odds ratio 8.2). This indicates that the association between gestational weight and LBW babies was statistically significant (p<.01). Mothers who had bad obstetric history showed overall poor outcomes as delivered LBW babies. The relationship between bad obstetric factors and LBW was found to be highly significant (p<.01) (Table 6).

Table 7

Relationship between LBW and Gestational weight (n=172)

Parity	No. of new borns	LBW		Odds Ratio	P Value
		No.	%		
<45	44	21	47.7	8.2	P<0.01
45-55	108	18	16.7	1.8	
=56	20	2	10.0	1.0	

Discussion

The present study shows the incidence of LBW to be 23.8% whereas Trivedi et al (6) and Kamaladoss et al (9) had reported 20.37% and 24.6% LBW respectively in their studies. The mean birth weight of the present study was 2.67 Kg (± 0.42 Kg) which was quite low when compared to the study conducted by Ramankutty et al (1). A higher number of LBW babies were born to mothers who had only one antenatal visit. Similar findings have been reported in various studies (9-11). The lowest numbers of LBW babies were delivered by mothers who got registered in the first trimester for their antenatal checkup. This was similar to what was observed by Anand et al (10). The incidence of LBW was high among young mothers of age 20 years and it was found to be significantly higher in primiparas. Similar observations were also reported by Kamaladoss et al (9) and Anand et al (10). More number of LBW were born to mothers whose inter pregnancy interval was < 12 months. This finding indicates the importance of birth spacing in preventing LBW babies. Mothers shorter than 150 cm of height delivered a higher proportion of LBW babies. The relationship between height and birth weight was not found to be significant. This was also reported by Amin et al (11). On the contrary, Kraemer (8) and Trivedi (6) reported a significant association between maternal height and low birth weight. The relationship between gestational weight and LBW was highly significant (p<.01) in this study. Several studies (9-13) have also reported the similar association between gestational weight and LBW. Similarly mothers with bad obstetric history (BOH) delivered more number of LBW babies than mothers with no BOH and this was in accordance with other studies (9-15).

Conclusion

As there are several factors interacting in this phenomenon so it is not feasible to single out any particular factor affecting low birth weight. Among the various epidemiological factors the maternal factors like antenatal care, parity, inter pregnancy interval and bad obstetric history are found to influence birth weight. Hence, it is the need of the hour to strengthen the existing maternal services at the basic level of community i.e., at door steps of the beneficiaries if possible.

References

1. Ramakutty P, Tikreti RAS, Resam KW. A study on birth weight of Iraqi children. *J Trop Pediatr* 1983; 29: 5-10.
2. Makhija K, Murthy GVS, Kapoor SK, Lobo J. Socio- biological determinants of birth weight. *Ind J Paed* 1989; 56: 639-43.
3. Schlep FP, Pongpaew P. Analysis of low birth weight rates and associated facors in a rural and an urban hospital in Thialand. *J Trop Paedtr* 1985; 31: 5-8.
4. World health report. Fighting diseases, fostering development. Geneva, 1996; 115-37.
5. UNICEF. The progress of Nations, New York, United Nations Children's Fund, 1997.
6. Trivedi CR, Mavalankar DV. Epidemiology of low birth weight in Ahmedabad. *Ind J Paed* 1986; 53: 795-800.
7. Karan S, Mathur B, Surender YA *et al*. Incidence and causes of perinatal mortality at the institute of child health hospital. *Ind Paediatr* 1972; 99-105.
8. Kraemer MS. Determinants of delivering low birth weight. Methodological assessment and meta analysis. *Bull WHO Org* 1987; 65: 663-737.
9. Kamaladoss T, Abel R, Sampathkumar V. Epidemiological correlates of low birth weight in rural Tamil Nadu. *Ind J Paed* 1992; 59:209-304.
10. Anand K, Garg BS. A study of factors affecting low birth weight. *Ind J Com Med* 2000; 25(2): 57-61.
11. Amin N, Abel R, Sampathkumar V. Maternal risk factors associated with low birth weight. *Ind J Paed* 1993; 60: 269-74
12. Terry PB, Condie RG, Bissenden JG, Kerndge DF. Ethenic differences in incidence of low birth weight and neonatal deaths among normally formed infants. *J Br Pediatr Assoc* 1987; 62: 709-12.
13. Randhawa I, Kanwar JS. An epimiological study of LBW. *J Obst Gynae Ind* 1990; 40: 62-68.
14. Desai P, Desai M, Hazra M. Obstetric outcome in patients with history of spontaneous abortion. *J Obst Gynae Ind* 1993; 43(3): 324-27.
15. Prazuch T, Tall F, Roisin AJ, Konfe S, Cot M, Lafair C. Risk factors for preterm delivery in Burkina Faso (West Africa). *Int Jr Epid* 1993; 22(3): 489-94.

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