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Epidemiological Co-relates of Low Birth Weight in Rural TamilNadu

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A total of 328 consecutive births born between July and September 1990 were analysed. The rate of LBW was 24.6%. The mean birth weight was 2.72 kg (± 0.44 kg). Association between LBW and parity, mother's age, mother's height, gestational weight, risk status at pregnancy and antenatal care was observed. These results indicate that there is a need to strengthen maternal services to address the problem of LBW in India.

Key words : Low birth weight (LBW); Parity; Mothers age and height; Gestational weight; Risk status at pregnancy.

Low birth weight (LBW) infants run the risk of high mortality and morbidity than do infants with normal birth weight.[1] Over 50% of perinatal deaths and nearly one-third of infant deaths are due to low birth weight.[2] Recognised as a reliable index of intrauterine growth, birth weight assumes significance as one of the major factors determining child survival and future growth.[3] The prevalence of 30% LBW in India is very high[4] as compared to 4-5% in industrially developed countries.[2] No single factor can be attributed to the high incidence of LBW, although the most important cause is fetal growth retardation due to maternal malnutrition because of sub-optimal food intake and infections like diarrhea.[5]

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The causes of LBW are multifactorial. Kramer[6] in a review article has identified 43 factors as possible determinants of LBW. Out of these socio-economic status, parity, maternal height, pre-pregnancy weight, gestational weight gain, caloric intake, urinary tract infection and quality of antenatal care were listed as prominent factors causing LBW.

Though birth weights are recorded at the hospital, accuracy is of doubt as there is every chance for the value being rounded off by the nurse. On the otherhand, the most important segment of the population, the poor who run a high risk of delivering LBW babies deliver at home. This segment is usually missed from birth weight recording.

This study is based on the data taken from an ongoing birthweight monitoring programme, which forms part of a major health and development programme of Rural Unit for Health and Social Affairs

(RUHSA) Department, Christian Medical College and Hospital, Vellore. Although the birth weights are recorded at the base hospital of RUHSA, parallel birth weight monitoring programme is being carried out which records birth weigh both at base hospital as well as at home. Apart from birth weight, other associated factors like parity, age of mother, height of mother and gestational weight are also collected. The purpose of this study is to identify the epidemiological factors affecting birth weight.

MATERIAL AND METHODS

The records of 328 consecutive births between July and September 1990 of the birth weight monitoring programme of RUHSA Department, Christian Medical College and Hospital were analysed with respect to the weight of the new born and some of the prominent factors like sex, programme area and outside programme area, parity, age of the mother, height of the mother, antenatal care, gestational weight, and risk status at pregnancy. Still births were excluded from this analysis.

RUHSA Department, Christian Medical College and Hospital, Vellore was started in the year 1977 in K.V. Kuppam block which has a population of a little over 100,000. A health and development programme is being implemented in the entire block. It has a base hospital at Kavanur, the head quarters of RUHSA, and it operates through 18 peripheral service units (PSU) with each PSU having a population of 5,000-7,000.

The birth weight monitoring programme was started in the year 1990. Prior to it, births were recorded only at the base hospital while births of home deliveries were not recorded. Since 1990, the birth weight monitoring programme records birth weights both at the base hospital as well as of birth weights of home deliveries.

Table 1. Percentage, Means and Standard Deviations of Birth Weights

Weights (kgs)	No.	Percentage (%)	Mean (kgs)	S.D.
1.5–2.4	81	24.6	2.16	± 0.23
2.5–3.4	232	70.8	2.85	± 0.33
3.5–4.1	15	4.6	3.69	± 0.19
Total	328	100.0	2.72	± 0.44

Birth weights of babies born at base hospital, home and of mothers coming for tubectomy cases are recorded within 5 days. The babies are weighed by a single person using the same salter weighing scale caliberated at regular intervals for all births.

Statistical analysis with respect to chi-square and odds ratio were done.

RESULTS

The birth weight distribution of babies born at the base hospital, at home and of mothers coming for tubectomy cases are shown in Table 1. The rate of LBW was 24.6%, while the mean birth weight of 328 new borns was 2.72 kilograms (± 0.44 kg). There were no babies with birth weight less than 1.5 kg.

Females (25.7%) had a higher rate of LBW than males (23.4%). However it was statistically not significant ($P<0.5$). The odds ratio was 1.13 which means that a female has 1.13 times the risk of a male of being low birth weight. The rate of LBW was 24.7% for programme area and it was more or less the same for outside programme area (24.6%). The differences

TABLE 2. Parity and Birth Weight

Weights (kgs)	Parity								Total
	1		2		3		≥ 4		
	No.	%	No.	%	No.	%	No.	%	
1.5–2.4	32	36.8	20	23.0	15	15.3	14	25.0	81
2.5–3.4	52	59.8	63	72.4	81	82.7	36	64.3	232
3.5–4.1	3	3.4	4	4.6	2	2.0	6	10.7	15
Total	87	100.0	87	100.0	98	100.0	56	100.0	328

*X^2 = 17.96; P<0.01 (significant);
** Odds ratio : Parity 1/Parity 2 = 1.95, Parity 1/Parity 4 = 1.75,
Parity 1/Parity 3 = 0.95 Parity 2/Parity 4 = 0.9

TABLE 3. Mother's Age and Birth Weight

Weights (kgs)	Age (yrs)								Total
	16-19		20-25		26-30		31-35		
	No.	%	No.	%	No.	%	No.	%	
1.5–2.4	13	32.5	51	23.8	15	23.4	2	20.0	81
2.5–3.4	25	62.5	155	72.4	45	70.3	7	70.0	232
3.5–4.1	2	5.0	8	3.8	4	6.3	1	10.0	15
Total	40	100.0	214	100.0	64	100.0	10	100.0	328

* X^2 = 9.03; P>0.5 (Not significant); ** Odds ratio : 1.56

were statistically not significant (P<0.5). The odds ratio was 1.

Table 2 shows the results of parity and birth weight. The LBW rate was high for parity 1 (36.8%) when compared to parity 2 (23.0%), parity 3 (15.3%) and parity 4 (25.0%). The odds ratio for parity 1 and 2 was 1.95, for parity 1 and 4 it was 1.75 and for parity 1 and 3 it was 0.95 while for parity 2 and 4 it was 0.9. This indicates that parity 1 has 1.95 times and 1.75 times the risk of parity 2, 3 and 4 of delivering LBW babies.

The percentage of LBW was higher for mothers with age ≤ 19 years (32.5%). Young mothers (≤ 19 year) had 1.56 times (odds ratio) the risk of older mothers (≥ 20 years) of delivering LBW babies (Table 3).

Table 4 shows the relationship of mother's height, gestational weight, risk status at pregnancy and antenatal care with

TABLE 4. Relationship of Mothers Height, Gestational Weight, Risk Status at Pregnancy and Antenatal Care with Birth Weight

	1.5-2.4	2.5-3.4	3.5-4.1	X^2 Test	Odds ratio
Mother's height					
< 145 cm	29.7 (22)	66.2 (49)	4.2 (3)*	P>0.5 (not signi-ficant)	1.32
≥ 145 cm	24.2 (47)	70.1 (136)	5.7 (11)		
Gestational weight					
≤ 50	52.2 (48)	46.7 (43)	1.1 (1)	P<0.01 (signi-ficant)	7.64
> 50	12.5 (22)	80.1 (141)	7.4 (13)		
Risk status at pregnancy					
Low	20.3 (45)	74.8 (166)	4.9 (11)	P>0.1 (not signi-ficant)	0.49
High	33.9 (36)	62.3 (66)	3.8 (4)		
Antenatal care					
Booked	23.3 (47)	70.8 (143)	5.9 (12)		
Unbooked	29.9 (32)	67.3 (72)	2.8 (3)	P>0.5 (not signi-ficant)	0.71

* number in parentheses

birthweight. The rate of LBW was high for mothers with < 145cm (29.7%) than mothers with ≥ 145 cm (24.2). This difference was however statistically not significant. By odds ratio calculation it is seen that mothers with < 145 cm height have 1.32 times the risk of mothers with ≥ 145 cm height of delivering LBW babies. The rate of LBW is low for booked ANC cases (23.3%) than unbooked ANC cases (29.9%). The odds ratio is 0.71. This was statistically not significant. Since pre-pregnancy weight was not available, gestational weight at third trimester instead of gestational weight gain is given. The rate of LBW was high for mothers whose gestational weight at third tri-

mester was ≤ 50 kg (68.6%) than mothers whose gestational weight was >50 kg (31.4%). This was highly significant (P<.001). The odds ratio was 7.64. High risk pregnant mothers (34.0%) had a high percentage of LBW than low risk pregnant mothers (20.3%) although statistically not significant. The odds ratio was 0.49.

DISCUSSION

In the present study the low birth weight (LBW) was 24.6%. LBW here is defined as birth weight less than 2.5 kg. Trivedi *et al*[2] had reported 20.37% percent LBW, though for India as a whole it was around 30-40%.

The incidence of LBW in India was high when compared to other countries and for the world as a whole the incidence of LBW was 18% as of 1979. For developed countries it was quite low. Northern Europe had 6% percent LBW rate while North America had 7% LBW rate. Indian LBW rate was also higher than South East Asian countries like Philippines (19.5%), Singapore (11.2%), Malaysia (9%) and Burma (20%).[1]

The mean birth weight of the present study was 2.72 kg (± 0.44 kg) which was quite low when compared to studies reported from Iraq[3] and Pakistan.[7] Females had a higher rate of LBW than males. Likewise the incidence of LBW was high among first para women and young mothers. By odds ratio calculation it was seen that first para women were at a higher risk of delivering LBW babies than second, third and fourth para. Similar observations on the relationship of sex, age and parity with LBW was made by different studies.[1,3,7,8] Maternal height, antenatal care and gestational weight were also associated with LBW. Gestational weight in this study is used as a proxy for gestational weight gain. The relationship between gestational weight and LBW was highly significant (P<.001). Several studies have reported similar association.[3,4] However with regards to antenatal care, Trivedi *et al.* had observed significant association between antenatal care and birth weight, but Ramankutty *et al.* failed to observe this in their study for which they have stated that the definition of antenatal care services particularly the nature and quantum of care needs to be clarified.[2,3] Similarly high risk pregnant mothers delivered more number of LBW babies than low risk pregnant mother. However this was statistically not significant.

To conclude, there are several factors at interplay and it is not possible to single out any particular factor influencing LBW. As seen it is mostly the maternal factors like parity, age of mother, and maternal height that are found to influence birth weight. Hence there is a need to strengthen the existing maternal services which could possibly reduce the incidence of LBW. Secondly the problem of maternal undernutrition needs to be addressed. Birth weight monitoring proves to be a useful strategy for detecting the incidence of LBW as well as determining the epidemiological causes of it.

REFERENCES

1. Schelp FP, Pongpaew P. Analysis of low birth weight rates and associated factors in a rural and an urban hospital in Thailand. *J Trop Pediatr* 1985; 31 : 4-8.
2. Trivedi CR, Mavalankar DV. Epidemiology of low birth weight in Ahmedabad. *Indian J Pediatr* 1986; 53 : 795-800.
3. Ramankutty P, Tikreeti RAS, Rasam KW et al. A study on birth weight of Iraqi children. *J Trop Pediatr* 1983; 29 : 5-10.
4. Terry PB, Condie RG, Bissenden JG, Kerridge DF. Ethnic differences in incidence

of low birth weight and neonatal deaths among normally formed infants. *J Br Pediatr Assoc* 1987; 62 : 709-712.
5. Lechtig A. Predicting risk of delivering low birth weight babies: which indicator is better. *J Trop Pediatr* 1988; 34 : 34-41.
6. Kraemer MS. Determinants of low birth weight: Methodological assessment and meta analysis. *Bull WHO Org* 1987; 65 : 663-737.
7. Nagra SA, Gilani AH, Ahmad MD, Haq EV. A longitudinal study in body weight of Pakistani infants as influenced by socio-economic status. *J Trop Pediatr* 1984; 30 : 217-220.
8. Strahan M. Birth weight in a rural Solomon Island population. *J Trop Pediatr* 1984; 30 : 293-295.

GLOBAL SURVEILLANCE OF ANTIBIOTIC RESISTANCE?

Increasingly reports appear about the resistance to antibiotics of common bacterial pathogens. In India, we have witnessed the devastating effect of *salmonella typhi* resistant to chloramphenicol and many other commonly used antibiotics. There is a recent report of B-hemolytic streptococci resistant to erythroaryem in Finland.

Strains of bacteria become resistant to an antibiotic by making a protein that its susceptible ancestors could not make. This protein, usually an enzyme, inactivates incoming molecules of the antibiotic (like B-lactamases), or somehow protect the bacteria from the antibiotic. Commonly, such resistance appears after decades of use of the antibiotic prevalence of a new resistance gene begins to increase under selection, eventually recombining into plasmids which transfer the generally evolve in the patient during treatment, as we used to think, but nearly always in another species of bacteria colonising another host, perhaps in another country. It always starts with an excessive use of an antibiotic in one country. As the world's bacteria from networks to spread resistance to antibiotics we need to build our own networks to control this resistance.

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