MATERNAL RISK FACTORS AND LOW BIRTH WEIGHT

By

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SUMMARY

Mothers of 837 singleton live newborns from one teaching hospital two urban hospitals and 3 rural maternity and child welfare centres, all in Udupi taluka were studied from August 1985 to June 1986, to determine, the maternal factors in this area, responsible for low birth weight babies.

Age, educational status, antenatal care, birth order, birth interval, weight, height and hemoglobin level were some of the factors subjected to detailed statistical analysis. Cut off levels for birth interval, weight, height and hemoglobin were determined, based on the frequency distribution, below which these constituted risk factors.

The most important factors for low birth weight in this region were mothers who had received no antenatal care, teenage pregnancy, mothers with weight less than 45 kg and illiteracy of mothers.

The article emphasizes the need to identify risk factors for each community. Peripheral workers can then be trained to identify high risk mothers based on history and simple physical examination and institute remedial measures.

Introduction

Maternal risk factors for low birth weight have been determined by few other workers (Prema 1979, Bachani *et al* 1985). Due to wide variations, factors operating in one region may not be applicable in other parts of India. Also, defining maternal factors which can be assessed by history and simple clinical examination will help the peripheral health worker to refer high risk cases.

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In Udupi taluka 86.6% (baseline survey of Community Medicine Dept. 1987) of all deliveries are institutional, hence a hospital based study was used to determine the maternal risk factors for low birth weight.

Material and Methods

Mothers of 837 live singleton babies from the Kasturba Hospital Manipal, Mission Hospital and Govt. Maternity Hospital, Udupi and three Rural Maternity and Child Welfare Homes around Udupi, were studied during the period August 1985 to June 1986. Twins and

infants with congenital malformations were excluded. All babies were weighed, naked, immediately after birth in beam balances, which were calibrated frequently. Gestational age was assessed from history of last menstrual period and confirmed by physical examination of the infant. The variables studied included age of mother, educational level of parents, parity, birth interval, details of antenatal care, weight, height and hemoglobin level of the mother.

All mothers were interviewed by the Chief Investigator and answers recorded in a pretested proforma. Weight and height of mothers were taken within 48 hours after delivery. Morse *et al* (1975) found that mothers returned to pre-pregnancy weight within 15 days of delivery and maternal post delivery weight in the first 15 days was higher only by 2.4 kg. Therefore 2.4 kg was deducted from all the maternal weights to get the pre-conceptional weight of each mother.

The data was analysed to calculate the odd's ratio and attributable risk of LBW. Odd's ratio, also known as cross product ratio, is a measure of the association between exposure to a certain risk factor and occurrence of disease (in this case LBW). Attributable risk provides an estimate of the amount by which the disease could be reduced in the population if the suspected factors were eliminated or modified. Based on the frequency distribution, cut off levels were determined for weight, height, hemoglobin level and birth interval in mothers of this region, below which these variables constituted a risk for LBW.

Calculation of odd's ratio and attributable risk is shown in Table I as per Kahn (1983).

TABLE I
Odd's Ratio (OR) & Attributable Risk (AR)

Risk factor	Undesired outcome (LBW)	Desired outcome (NBW)
Present (Teenage)	18 (a)	26 (b)
Absent ($\geqslant$ 20 yrs)	172 (c)	621 (d)

(i) Odd's ratio $= \frac{a \cdot b}{c \cdot d} = \frac{a \times d}{b \times c}$

$\frac{18 \times 621}{18 \times 26} = 2.50$

(ii) Attributable risk $= \frac{x-y}{x} \times 100 = 46.98\%$

Where $x = \frac{a}{a + b}$

$y = \frac{c}{c + d}$

Discussion

The mean birth weight was 2775 ± 501.91 gms. All infants weighing less than and equal to 2,500 gms were considered as low birth weight (LBW). The remaining were normal birth weight (NBW) infants. Incidence of LBW was 22.7% (190). Of the LBW infants 75.2% (146) were term and the rest were preterm (Table II).

TABLE II
Period of Gestation and LBW

Gestational age	Low birth weight	
	No.	Per cent
Preterm	44	24.8
Term	146	75.2
Total	190	100.0

A. Social factors (Table III):

Teenage mothers constituted 5.2% (44) of cases as compared to 15.7% reported

TABLE III
Social Factors

	Outcome		OR	P	AR(%)
	LBW	NBW			
A. Age of mother					
⩽ 19 yrs.	18	26	2.50	<.005	46.98
>19 yrs.	172	621			
B. Mothers Education					
illiterate	41	79	1.98	<.005	62.18
literate	149	568			
C. Fathers Education					
illiterate	30	57	1.94	<.01	59.53
literate	160	570			

by Colleen *et al* (1985). This low incidence can probably be explained by the late mean age at marriage in Udupi taluka which is 21.7 years (Baseline survey of Community Medicine Department 1987) as compared to the national average of 18.6 years. Colleen *et al* (1985) noticed an increased incidence of LBW among teenagers. In this study also the odd's ratio for LBW among teenagers is significantly high.

85.7% (617) of women in the study group were literate. Among the illiterate odd's ratio and attributable risk was very high.

B. Obstetric factors (Table IV):

In this study 43.1% (362) cases were primipara. Bachani *et al* (1985) reported only 23.2% primipara in their study. Prema (1985) observed an increased incidence of LBW in primipara but Bachani *et al* (1985) and Pachauri and Marwah (1971) demonstrated that parity had no effect on birth weight. The odd's ratio for LBW was significantly high at 2.50 in this study.

Of the cases studied 56.9% (475) were multipara. Of these 40.2% (191) had had a child within 24 months of previous delivery. These mothers were at a high risk for LBW (odd's ratio = 1.91).

Prema (1985) has reported that antenatal care when begun in the 2nd trimester showed a marked improvement in birth weight. She also mentions that an average of five visits would be adequate. In this study the number of women who had received some antenatal care were 94.2% (792). Of these only 18.8% (149) had come for 5 or more visits. The odd's ratio for LBW for those who received no antenatal care was 2.93 but that for those who had less than 5 visits was 1.9. It may be observed that those not receiving any antenatal care are significantly more at risk than those who had received some antenatal care, even be it less than 5 visits.

WHO defines anaemia in pregnancy as hemoglobin less than 11 gms/dl. Other workers Prema (1985) and Shah (1983) have used cut off levels of 8 gms/dl below which hemoglobin level was a risk for LBW. In this study 11 gms/dl was

TABLE IV
Obstetric Factors

Risk factors	Outcome		OR	P	AR%
	LBW	NBW			
Parity					
= 1	97	265	1.50	<.025	26.90
>1	93	382			
Birth interval					
≤ 24 months	49	142	1.88	<.05	28.53
>24 months	44	240			
Antenatal care					
Nil	20	25	2.92	<.005	51.71
Present	170	622			
No. of visits					
1-5	150	493	1.96	<.01	45.69
>5	20	129			
Hemoglobin level					
≤ 11 gms/dl	119	338	1.53	<.025	28.23
>11 gms/dl	71	309			
Bad Obstetric History					
Present	6	26	0.78	*Inconclusive because of small numbers	
Absent	184	621			

taken as cut off level, based on the frequency distribution. Even so, only 54.6% (457) mothers had hemoglobin level less than 11 gms/dl as compared to high levels of 81% in Bihar and 87% in Uttar Pradesh as reported by Agarwal *et al* (1987). The odd's ratio for LBW was small in these mothers.

3.8% (32) women had previous bad obstetric history. Eisner *et al* (1979) have reported a 50% higher risk for LBW in such women. However, Dougherty and Jones (1982) could demonstrate no correlation between previous losses and birth weight. In this study odd's ratio for LBW for women with previous bad obstetric history was 0.78 which is inconclusive. This is probably due to very small numbers.

C. Maternal Anthropometry (Table V):

Shah (1983) and Prema (1979) have used maternal weights of less than 38 kg and less than 40 kg respectively as cut off levels below which there is an increased risk of LBW. Based on frequency distribution, a cut off level of 45 kg was determined in this study for mothers in this area. 61.8% (528) of women weighed less than 45 kg. An annual report of the National Institute of Nutrition, Hyderabad (1982) mentions that after an initial loss of 1-2 kg in the first trimester

TABLE V
Maternal Anthropometry

Factor	Outcome		OR	P	AR%
	LBW	NBW			
Weight (kg)					
≤45	148	380	2.47	<.001	51.52
>45	42	267			
Height					
≤150 cms	97	267	1.48	<.025	26.23
>150 cms	93	380			

most mothers regain their preconceptional weight by 20 weeks. Prema (1979) reported that most mothers in India come for their first antenatal check-up around 20 weeks. Combining the above facts it may be stated that a mother in this area who weighs less than 45 kg at 20 weeks gestation or shows less than the expected increase thereafter may be considered to be at risk for producing LBW babies. The odd's ratio for LBW in such mothers was high at 2.47.

Prema (1979) and Khatua *et al* (1970) observed a high incidence of LBW in mothers with heights less than 140 cms and 150 cms respectively. The cut off level determined in this study was less than 150 cms and 43.4% (364) mothers fell into this category. The odd's ratio for LBW however was not significant in this group.

Conclusion

The most important maternal risk factors, in descending order, were:

(1) No antenatal care
(2) Teenage pregnancy
(3) Maternal weight less than 45 kg at 20 weeks of gestation
(4) Maternal illiteracy

The cut off levels of factors like weight, height and hemoglobin of mother were found to be different, in this study as compared to the others. The above risk factors though easily identifiable by all peripheral health workers may not be responsible for LBW in other parts of India. Similar studies in other regions is the need of the day.

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