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Epidemiology of low birth weight in Ahmedabad

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The study to elucidate epidemiological features of LBW (low birth weight) babies shows incidence of LBW to be 20·37%, out of 481 single births studied in 1982. 6·03% were small for gestational age (SGA). Of LBW babies 61·22% were born preterm (<37 weeks) as compared to 31·85% of normal babies. Of preterm babies 3·3% were SGA, while 7·69% of fullterm babies were SGA. SGA babies were found to be significantly related to parity, being most common in primi, and without antenatal care (ANC). Younger (15-25 years), shorter and primipara mothers were more likely to give birth to LBW babies. Of mothers giving birth to normal babies 85·52% had taken ANC, as compared to 67·34% giving birth to LBW babies. SGA was more common in mothers who had not taken ANC. Young, short and primipara mothers, who are prone to give birth to LBW babies should be detected early and brought under qualitative ANC.

Key words : Low birth weight; small for gestational age; parity; maternal height; preterm; antenatal care.

Low birth weight (LBW) babies form a pediatric priority, because they have less chances of survival than babies weighing over 2500 gm. Half of perinatal and one-third of infant mortality are due to LBW.[1] LBW may lead to serious physical and mental handicap in those who survive. Its incidence in India is estimated to be 28% as compared to about 5-7% in some of the industrially advanced countries.[2] LBW which is not explained by an obvious cause, such as perinatal complication, multiple pregnancy etc., has a very complex etiology.[3] A study to gauge the extent and epidemiological contributors of LBW is reported.

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Material and Methods

The present study was carried out at Sheth Chinai Maternity Home, Ahmedabad-6, from March to August, 1982. This institute serves patients from the city of Ahmedabad and surrounding suburbs and villages. Most of the patients belong to lower socio-economic group. During the period of study, 489 births were analysed to know the extent and epidemiological features of LBW. Out of 489 births, eight were twins and 481 single births. Further analysis was done on the basis of single births i.e. 481. Day-to-day interrogation and examination of mothers and babies were carried out. Height of mothers was recorded without footwear. Babies were weighed naked. As laid down by WHO[4] all babies weighing less than 2500

gm at the time of birth were considered as LBW babies. All those born before 37 weeks of gestation were considered as preterm. All babies were classified into appropriate and small for gestational age (SGA), later being those below 10th percentile of weight for gestational age.[5] For testing statistical significance, standard methods namely standard error of difference between two means, two proportions, i.e. Z test and chi-square were utilised.[6]

Results

Of 489 births studied, eight (1·64%) were twins while 98 (20·37%) babies had LBW and 383 had normal weight. Mean birth weight of babies (Table I) was 2798 gm (S.D.±526·9).

Preterm babies. Sixty (61·22%) LBW babies were born preterm, while 122 (31·85%) normal babies were born preterm. ($P<0·001$; Z value=5·36). Amongst preterm babies six (3·30%) were SGA, while amongst full term babies, 23 (7·69%) were SGA ($P<0·05$; Z value=2·16).

Table I. Distribution of birth weight

Birth weight	Babies	
	No.	%
<1000 g	1	0·21
1000-1499 g	7	1·46
1500-1999 g	16	3·32
2000-2499 g	74	15·38
2500-2999 g	154	32·02
3000-3499 g	180	37·42
3500 g and >	49	10·19
Total	481	100·00

Mean birth weight=2798 g; S.D.±526·9
(based on individual data)

SGA babies. There were 29 (6·03%) SGA babies in all. On comparison between SGA and appropriate for gestational age (AGA) babies, no significant differences were found as regards sex of the baby, religion, occupation and height of mothers. However, incidence of SGA was significantly associated with birth order, SGA being most common in first birth, then gradually declining during third birth, and again increasing from fourth birth (Table II). While comparing <2000 g group of babies with 2000-2499 g group it was observed that 27·59% of SGA babies fell into the former group, and 72·41% in the later group. There were no SGA babies weighing more than 2500 g (Table III).

Sex of the baby. Sex differences between LBW and normal babies were not significant with 45 (45·91%) and 187 (48·84%) males respectively in both the groups.

Religion and occupation of mothers. There were no differences between the religion of mothers of LBW and normal babies. Similarly, there were no significant differences between the occupations of both the groups of mothers.

Mother's age was significantly associated with birth weight, younger mothers having given birth to more of LBW babies (Table IV).

Mother's height. Mean height of mothers giving birth to LBW babies was 149·63 cm, while that of mothers of normal babies was 151·18 cm. The difference was significant ($P<0·05$; Z value=2·18). Mothers shorter than 152·4 cm (5 feet) gave birth to higher proportion of babies

Table II. Parity, birth weight and SGA

Parity	Normal		LBW		SGA		Non SGA	
	No.	%	No.	%	No.	%	No.	%
1	119	31·07*	49	50·00*	16	55·15**	152	33·63**
2	99	25·84	24	24·59	6	20·67	117	25·88
3	84	21·93	8	8·16	1	3·44	91	20·13
4	43	11·22	9	9·18	3	10·32	49	10·84
5 and >	38	9·94	8	8·07	3	10·32	43	9·52
Total	383	100·00	98	100·00	29	100·00	452	100·00

*$P<0·001$; Z value=3·39; **$P<00·5$; Z value=2·27

Table III. Small-for-gestational age (SGA) and birth weight

Birth weight	SGA		Non SGA	
	No.	%	No.	%
<2000g	8	27·59	16	3·54
2000-2499 g	21	72·41	53	11·73
2500 g and >	0	00·00	383	84·73
Total	29	100·00	452	100·00

with birth weight below 2500 g, while mothers 152·4 cm and above gave birth to higher proportion of babies with birth weight more than 3500 g (Table V).

Parity is found to be significantly associated with birth weight, LBW being most common in first para (Table II).

Antenatal care (ANC). Sixty six (67·34%) mothers of LBW babies had taken ANC against 319 (85·52%) mothers of normal babies ($P<0·001$; Z value= 3·58). Incidence of SGA was 2·5 times higher in those mothers who did not take ANC as compared to those who took it (Table VI).

Disease during pregnancy. On analysing relationship between disease during pregnancy and birth weight, it was observed that there was no significant association between the presence of at least one disease during pregnancy and LBW. However, the presence of at least one disease like anemia, tuberculosis, toxemia, Rh-incompatibility etc during pregnancy was found to be significantly associated with the incidence of SGA babies (Table VII).

Discussion

LBW is fairly common in India, perhaps because of widespread malnutrition in women, particularly during pregnancy. The present study shows the incidence of LBW to be 20·37%. Verma[7] mentions it to be about 30-40% in India against 5-7% in developed countries. Of 20·37% LBW in this study, 15·38% fell between 2000-2499 gm birth weight (Table I) Hence, if the cutoff point for LBW is set at 2000 gm, as suggested to be proper in Indian setting by many, the proportion of LBW would get considerably

Table IV. Mother's age and birth weight

Age (yr)	LBW		Normal		Total	
	No.	%	No.	%	No.	%
15-25	71	26·59	196	73·41	267	100·00
>25	27	12·61	187	87·39	214	100·00
Total	98		383		481	

$P<0·001$; Z value=3·97

Table V. Mother's height and birth weight.

Birth weight	Height <152·4 cm		He ight >152·4 cm		Total
	No.	%	No.	%	
<2000g	11	4·76	13	5·20	24
2000-2499 g	46	19·91	28	11·20	74
2500-2999 g	76	32·91	78	31·20	154
3000-3499 g	87	37·66	93	37·20	180
3500 and >	11	4·76	38	15·20	49
Total	231	100·00	250	100·00	481

$P<0·01$; X =18·928; Df-4

Table VI. SGA and antenatal care (ANC)

	ANC taken		ANC not taken		Total	
	No.	%	No.	%	No.	%
SGA	18	4·60	11	11·58	29	6·03
Non SGA	368	95·34	84	88·42	452	93·97
Total	386	100·00	95	100·00	481	100·00

$P<0·05$; Z value=2

Table VII. Disease during pregnancy and weight for gestational age

Weight for gestational age	No disease		At least one disease		Total	
	No.	%	No.	%	No.	%
SGA	9	3·52	20	8·89	29	6·03
AGA	247	96·48	205	91·11	452	93·97
Total	256	100·00	225	100·00	481	100·00

$P < 0{\cdot}05$; $X^{2B}=6{\cdot}1$

reduced. In this study 61·22% of LBW babies have been found to be born preterm, thus not being fully equipped to face the adversities of extrauterine life. Similarly, if the above cutoff point is adopted, the proportion of SGA babies would also get considerably reduced, because 72·41% of SGA babies have been found to be between 2000-2499 gm birth weight in the present study (Table III).

SGA was found to be significantly associated with parity and ANC (Table II and VI). However, no significant association was found between SGA, age and height of the mother. Srivastava et al[8] found similar results except that the mother's height was also significantly related to SGA. The incidence of LBW has been found to be significantly higher in primiparas in the present study. Crosse[3] also notes that the incidence of LBW is highest among first born infants. Ellis[9] found the incidence of LBW to be highest in first births.

The present study shows that about 85% of mothers of normal babies had utilised ANC against two-thirds of mothers of LBW babies. Drillien and Richmond[3] have shown interrelationship between parity, maternal height, ANC and LBW. Similar association of poor prenatal care with increased incidence of LBW has been shown by Douglas and Norregaard.[3] Of course, the quality of care is probably more important than quantity.

The risk of LBW is found to be significantly higher in younger mothers (15-25 years) as compared to older ones (Table IV). Crosse[3] found the highest incidence of LBW among mothers under 20 years of age. The incidence fell as mother's age increased until the age of 35-40 years, when it rose again. Dattabanik[10] also found higher incidence of LBW in mothers up to 20 years of age. Ghosh *et al*[11] found that women below 20 and above 40 years had increased incidence of LBW babies.

Mothers giving birth to LBW babies have been found to be significantly shorter than those giving birth to normal babies in the present study. Mothers shorter than 152·4 cm (5 feet) have given birth to higher proportion of babies with birth weight below 2500 gm, while mothers 152·4 cm and above have given birth to higher proportion of babies with birth weight more than 3500 gm (Table V). This suggest that the mother's height is significantly related to birth weight.

Bhargava[12] also observed similar results in his study. This may be because short height could suggest chronic malnutrition. Crosse[3] also recognised this and suggested that small stature might be associated with socioeconomic factors operative since early childhood. Ghosh et al[11] also found that shorter mothers gave birth to more LBW babies, while taller mothers gave birth to more of heavier babies. Ellis[9] also mentions that the incidence of LBW was found to be influenced by height of the mother in Aberdeen study. A similar association was also found in Edinburgh study.[9]

Though more female babies have been born with LBW, in the present study, the sex differences between LBW and normal babies are not statistically significant. Crosse[3] says that increased incidence of LBW among females is due to their lower average birth weight, which is exhibited as early as 29-30 weeks of gestation.

Differences between religion and occupation of mothers of LBW and normal babies were not found to be significant in the present study.

The present study shows that the presence of diseases like anemia, toxemia, tuberculosis, Rh-incompatibility etc during pregnancy increase the risk of SGA babies (Table VII). Ghai[13] reports that LBW is more common with maternal diseases. However, the present study has not shown any significant relationship between maternal disease and LBW.

In conclusion birth weight of a baby depends on its genotypic potentiality and nurture i.e. maternal environment, the later being more amenable to control. Hence younger, shorter and primipara mothers should be detected early and provided ANC, which should be highly specific and qualitative.

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