COMPARATIVE OUTCOME OF LOW BIRTH WEIGHT BABIES

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ABSTRACT

One hundred and fifty six babies with birth weight between 1500-2000 g and 103 full term-appropriate for gestational age (FT-AGA) babies delivered at University Hospital, District Hospital and village homes were included for a comparative study of mortality, morbidity and growth pattern. The low birth weight (LBW) babies from the three centres had similar birth weight and gestational age. Neonatal mortality rates for the LBW babies were similar at the three centres. The main cause of death were infections and aspiration with rates again being similar. Diarrhea and respiratory tract infections were common causes of morbidity. The mortality rates for the LBW babies were significantly higher as compared to FT-AGA babies irrespective of the place of delivery. The incidence of morbidities like diarrhea and respiratory infections were also higher in LBW babies. However, the differences were statistically significant mostly in the preterm group. The weight gain of all LBW babies was similar up to 3 months of age. The findings of an identical outcome for the LBW babies at village level to those managed at hospitals is an encouraging trend to increasing domicilliary care for LBW babies.

Key words: *Low. birth weight, Neonatal mortality, Prematurity.*

Low birth weight (LBW) with high mortality and morbidity continues to be a major public health problem in India. The vast majority of the Indian babies are born in rural homes and unless the outcome of these babies can be improved, improvement at hospital level is unlikely to change the overall national mortality figures. The hospital care of LBW babies requires massive expenses in terms of sophisticated equipment and trained personnel. Moreover, many LBW babies admitted to the Intensive Care Units die from nosocomial infections. In others, prolonged maternal separation leads to lactational failures. Also, the babies discharged from the nursery often have poor followup.

Realizing these varied problems, some authors(1) have encouraged increased maternal participation in nursery care. They showed that the mothers could be trained to look after even very LBW babies in the hospital. However, there are no studies on involvement of mothers in the rural areas, in order to improve the survival of LBW babies born in the villages. Besides, there is a marked paucity of data regarding the outcome of LBW babies born in rural homes. With this background, the present study was undertaken to compare the outcome of LBW babies born at hospital and rural homes with special reference to mortality, morbidity and weight gain pattern during the first 3 months.

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Material and Methods

This study was undertaken during February, 1985 to January 1986. The cases were selected from the consecutive births at (*i*) Neonatal unit, University Hospital, Banaras Hindu University (UH), (*ii*) Ishwari Memorial District Hospital, Varanasi (DH), and (*iii*) 10 villages of Cholapur Block, Varanasi. All preterms (gestation less than 37 weeks) or full term intra-uterine growth retarded (FT-IUGR) babies (weights less than 10th percentile for gestation) weighing between 1500-2000 g were included. Multiple births, babies with congenital malformations, birth trauma, birth anoxia and post maturity were excluded from the study. Normal full term-appropriate for gestational age (FT-AGA) babies (weights between 10-90 percentile for gestation), weighing more than 2500 g delivered immediately following the birth of the LBW baby and whose parents were agreeable for regular followup were taken as controls. The socio-economic status was categorized in accordance with the recommendations of the ICMR(2).

The university hospital has separate Neonatal Unit equipped for Level II care and has adequate round the clock arrangements for resuscitation and phototherapy in addition to routine facilities for maintaining a satisfactory environment for temperature, humidity and oxygen. Hand washing and other aseptic techniques were strictly followed in accordance to prelaid written instructions. In District Hospital, the babies were managed along with their mothers in general wards under the supervision of the attending pediatrictian. However, the investigators provided identical minimal supervision care as detailed below to the babies born at district hospital and village by twice a week visits. The mothers were trained in the neonatal care by informal education method with regular reinforcement on routine visits.

The minimal supervision care included advice regarding general cleanliness, hand washing, adequate baby clothing, maintenance of body temperature and cord care with spirit and triple dye. Breast feeding was encouraged and emphasis was given an early and frequent feeds. In babies requiring nasogastric feeding, intubation was done by the research personnel and the mothers were trained in the feeding by two-way demonstration method. The mothers were advised to ensure tube position before giving feeds. The amount of milk was specified in the form of filled syringes and the mothers were advised to continue the same amount untill the next visit. Mothers were advised to contact primary health centre for minor problems. All the babies received vitamin K injection.

The babies were followed up at the age of 15 days (± 3 days), 1 month (±3 days), 2 months (±1 wk) and 3 months (±1 wk). The LBW babies of the District Hospital were followed up at a special clinic at the same hospital on fixed day of the week. The neonates born in the village were followed up at their homes. For the babies born in District Hospital and village, it was often difficult to assign a definite diagnosis for the various morbidity and mortality. However, the diagnosis was assigned after a detailed history from the parents, physical examination of the neonate and scrutiny of available health records. Septicemia was considered when the baby had history of feeds, sluggish activity, fever or hypothermia. Aspiration was suspected when a baby suddenly became dyspneic and cyanosed following bouts of vomiting. Diarrhea was considered when there was six or more loose stools per day. Upper respiratory infection (URI) was diagnosed when

the baby had fever, cough or cold without rapid breathing or chest indrawing. Lower respiratory infection (LRI) was labelled if the baby had chest indrawing and rapid breathing along with other features of URI. The diagnosis of tetanus neonatorum was considered when the baby had feeding difficulty, excessive cry, opisthotonus and tonic spasm on disturbance. Hypoglycemia was considered when the blood sugar level was less than 25 mg/dl in LBW babies. In FT-AGA, the corresponding value was 35 mg/dl in the first 72 h and 45 mg/dl, subsequently(3).

Babies suffering from serious illnesses were transported by a hospital van to the University Hospital and were managed in general wards. All these cases were subsequently excluded from the growth study but were included for causes of morbidity in their respective category.

Statistical analysis was done using Student 't' and Chi-square tests.

Results

A total of 55 FT-IUGR, 101 preterm and 103 FT-AGA babies from the 3 study population were followed up.

Table I shows the baseline maternal and neonatal parameters for the 3 study population. The weight and gestational age of the babies were statistically comparable at birth. Parity was higher and socio-economic groups were lower amongst the rural women.

Out of the 56 LBW babies delivered at university hospital, 7 (12%) died in the first week. The corresponding figures for babies delivered at District Hospital and village were 12 and 8%, respectively. Between 7-28 days, there were 5(9%) deaths at university hospital, which was similar to that seen at District Hospital (6%) and village (10%). No baby died during 1-3 months period in any of the study groups. The most significant observation was that the mortality rates for LBW babies born either at University Hospital, District Hospital or village were identical (21, 18 and 18% respectively) ($p > 0.05$). The overall mortality for LBW babies was 19%. In the FT-AGA group, there were no deaths at University Hospital or District Hospital, while 1 (3%) baby delivered at village died due to gastro-enteritis. The mortality rates for the LBW babies were significantly higher as compared to the FT-AGA group, irrespective of the place of delivery ($p < 0.01$, < 0.05 and < 0.05 for University Hospital, District Hospital and village, respectively).

At the University Hospital, 7 of the 12 LBW deaths were attributed to septicemia with or without meningitis, 2 to aspiration, 1 each to hypoglycemia with respiratory distress syndrome and unknown cause. At the District Hospital, 5 of the 9 deaths were diagnosed as septicemia, 2 as hypoglycemia and 1 each as aspiration and unknown cause. In village, 4 babies died due to suspected septicemia, 2 each due to neonatal tetanus and aspiration. In one case, no definite conclusion could be made. Infection was the main cause of death at all the 3 places and the death rate due to infection was also similar (58, 55 and 66% at University Hospital, District Hospital and village, respectively; $p > 0.05$).

Table II shows the morbidity pattern in LBW babies during first 3 months. Diarrhea was a common morbidity noted at all study population. There were slightly higher incidence of diarrhea amongst the LBW babies born in villages as compared to babies born at University Hospital or District Hospital. However, the difference was not statistically significant. The morbidity pattern for upper respiratory infection was somewhat similar to that for

TABLE–*Baseline Maternal and Neonatal Parameters*

	Population	FT-IUGR	PT (Mean ± SD)	FT-AGA
Birth weight (g)	UH	1912 ± 100 (16)	1789 ± 157 (40)	2831 ± 240 (41)
	DH	1928 ± 107 (19)	1757 ± 161 (31)	2755 ± 245 (30)
	Village	1938 ± 75 (20)	1824 ± 138 (30)	2702 ± 224 (32)
Gestation (wk)	UH	38.3 ± 1.5 (16)	34.3 ± 1.6 (40)	38.8 ± 1.0 (41)
	DH	38.3 ± 1.6 (19)	34.3 ± 1.6 (31)	39.0 ± 1.2 (30)
	Village	38.3 ± 1.3 (20)	35.0 ± 1.1 (30)	38.5 ± 1.1 (32)
Maternal age (yr)	UH	24.0 ± 6.1 (16)	26.9 ± 5.8 (40)	24.0 ± 3.8 (41)
	DH	22.0 ± 5.2 (19)	23.9 ± 5.2 (31)	24.1 ± 4.4 (30)
	Village	25.5 ± 6.0 (20)	26.5 ± 3.1 (30)	27.2 ± 5.6 (32)
Parity	UH	1.0 ± 1.6 (16)	2.1 ± 2.3 (40)	1.4 ± 1.2 (41)
	DH	0.8 ± 1.2 (19)	1.6 ± 2.2 (31)	1.4 ± 1.4 (30)
	Village	1.8 ± 2.0 (20)	3.3 ± 3.2 (30)	3.1 ± 2.6 (32)
Socio-economic status	UH	4.1 ± 0.9 (16)	4.0 ± 1.0 (40)	3.4 ± 0.7 (41)
	DH	4.1 ± 1.2 (19)	4.4 ± 1.0 (31)	3.6 ± 0.6 (30)
	Village	5.0 ± 0.9 (20)	4.8 ± 1.1 (30)	4.0 ± 0.9 (32)

UH = University Hospital; DH = District Hospital; FT-IUGR = Fullterm intra-uterine growth retardation; PT = Preterm; FT-AGA = Fullterm appropriate for gestational age.
Figures in parentheses indicate sample size.

diarrhea with a higher incidence for FT-IUGR babies born at village. The difference was statistically significant only when the comparison was made with the District Hospital ($p < 0.05$). The incidence of morbidities like diarrhea and upper respiratory

TABLE II---*Morbidity Pattern Amongst Neonates During First Three Months*

	Population	% Morbidity FT-IUGR (n=50) a	Preterm (n = 76) b	FT-AGA (n = 102) c	Statistical significance a : c / b : c
Diarrhea	UH(85)	28(14)	37(30)	7(41)	NS/**
	DH(71)	11(18)	35(23)	10(30)	NS/*
	Village(72)	39(18)	43(23)	16(31)	NS/*
Upper respiratory infection	UH(85)	21(14)	37(30)	7(41)	NS/**
	DH(71)	17(18)	48(23)	13(30)	NS/**
	Village(72)	55(18)	35(23)	10(31)	***/*
Lower respiratory infection	UH(85)	7(14)	3(30)	2(41)	NS/NS
	DH(71)	17(18)	0(23)	0(30)	*/NS
	Village(72)	5(18)	9(23)	6(31)	NS/NS
Others	UH(85)	14(14)	3(30)	0(41)	*/NS
	DH(71)	17(18)	4(23)	7(30)	NS/NS
	Village(72)	17(18)	4(23)	6(31)	NS/NS

UH = University Hospital; DH = District Hospital; FT-IUGR = Fullterm intra-uterine growth retardation; FT-AGA = Fullterm appropriate for gestational age.
Figures in parentheses indicate sample size.
Chi squre test: p <0.05*; <0.01**; <0.001***; NS = Not significant

infection were higher in FT-IUGR as well as preterm babies as compared to FT-AGA group in all the 3 study population. However, mostly the differences were statistically significant when the comparison was made with the preterm group.

Table III depicts the mean weights of the different groups of LBW babies at birth, 1 month, 2 months, and 3 months of age. It is obvious that at different ages, the village born LBW babies had almost statistically comparable weights to their hospital born counterparts, suggesting a similar weight gain pattern irrespective of the place of delivery.

Discussion

This study shows that there were no significant differences in the mortality rates of LBW babies born at University Hospital, District Hospital and village. Similarly, the common causes of neonatal deaths among the LBW babies were infection and aspiration at all the 3 study population. There was no difference between the death rates due to infection. High neonatal deaths due to infection(4,6) and aspiration(4) have also been reported from other centres of India.

Diarrhea was a common morbidity noted in the present study. Diarrhea as the

TABLE III---*Pattern of Weight Gain of LBW Babies*

	Age	UH	DH (mean ± SD) (g)	Village
FT-IUGR		(n = 13)	(n = 18)	(n = 16)
	Birth	1946 ± 62	1941 ± 94	1950 ± 70
	1 mo	2479 ± 163	2550 ± 173	2625 ± 165*
	2 mo	3346 ± 372	3350 ± 214	3416 ± 356
	3 mo	4219 ± 453	4355 ± 233	4253 ± 338
Preterm		(n = 26)	(n = 22)	(n = 21)
	Birth	1848 ± 139	1808 ± 135	1865 ± 115
	1 mo	2297 ± 319	2275 ± 294	2366 ± 253
	2 mo	3030 ± 368	3013 ± 310	3160 ± 303
	3 mo	3978 ± 436	3993 ± 327	3969 ± 355

UH = University Hospital; DH = District Hospital.
Student 't' test: * $p < 0.05$; $p > 0.05$ in rest of the groups.

common illness during the first 6 months of life has also been reported by other workers(7-9). Similar to our findings, Srivastava *et al.*(9) also found a higher incidence of illness in LBW babies as compared to controls. There was slightly higher incidence of gastro-intenstinal infections in the babies born at village homes, which may be due to the general ignorance and poor sanitation of the rural mothers or to their inability to follow the feeding instructions properly. Similarly, the higher incidence of respiratory infection may be due to overcrowding, lower socio-economic status and poor hygiene in villages.

In the present study, it was interesting to find that the weight gain of LBW babies born at village was also similar to those born at University Hospital or District Hospital.

This study suggests that though the village born babies may have some disadvantage regarding perinatal care but these are reduced by health and nutrition education package, better follow-up and most importantly greater parental participation within the constraints of existing family environment and resources. It also shows that the rural mothers can be trained to look after their moderately low birth weight babies successfully with minimal supervision. Even though the numbers are small, this finding if replicated on larger numbers and different centres may have far reaching implications while planning intervention strategies for improving neonatal survival.

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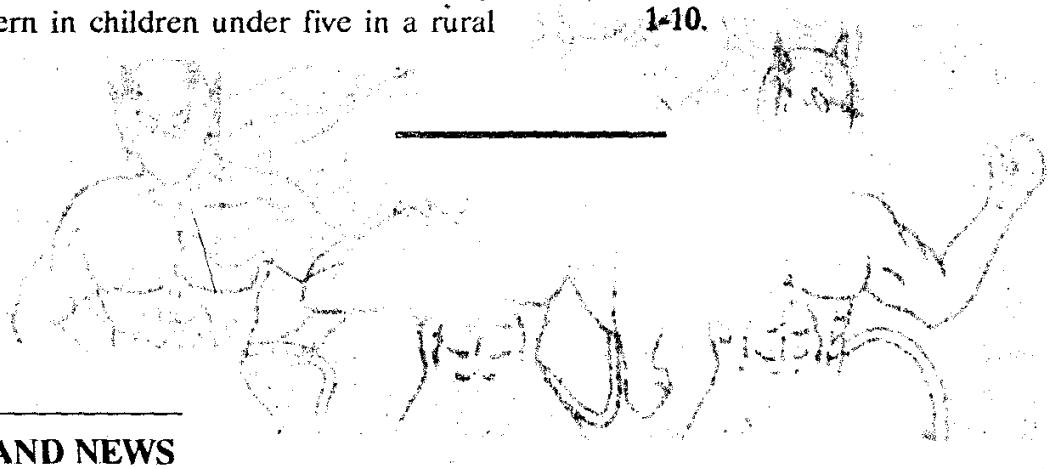

NOTES AND NEWS

THIRD COMMONWEALTH CONFERENCE ON DIARRHEA AND MALNUTRITION

The Third Commonwealth Conference on Diarrhea and Malnutrition is to be held in Shatin, New Territories, Hong Kong from *November 11th–14th, 1994*. This conference is organized jointly by the Department of Pediatrics, The Chinese University of Hong Kong and the Hong Kong Pediatric Society. Participation by over 300 delegates from throughout the Commonwealth is anticipated and, in this special meeting, we will be joined by colleagues from China.

Further details are available from:

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