ORIGINAL ARTICLES

MORTALITY PATTERNS IN BREAST VERSUS ARTIFICIALLY FED TERM BABIES IN EARLY INFANCY: A LONGITUDINAL STUDY

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ABSTRACT

The present study comprised 381 term babies weighing >2.5 kg and 126 babies weighing ≤ 2.5 kg (low birth weight; LBW) at birth. A longitudinal follow up of 334 babies was done for 6 months. There were 273 'breast fed' babies and 234 'artificially fed' babies. Neonatal mortality rate per 1000 live births for term babies was 37.5, LBW had a rate of 31.5 while those weighing >2.5 kg at birth a rate of 5.9; artificially fed had a mortality rate of 21.6 while breast fed had a low rate of 15.8. For 1-6 months period a mortality rate per 1000 live births of 53.8 was found for term babies, breast fed a rate of 23.9 while artificially fed a rate of 29.9; LBW had a rate of 44.9 while those weighing more than 2.5 kg at birth, a rate of 9. Low birth weight babies whether breast fed or artificially fed had significantly higher mortality than similarly fed babies weighing more than 2.5 kg at birth. Hence, mortality rate for term babies in early infancy can be reduced by simultaneous promotion of breastfeeding and prevention of low birth weight as it was dependent on both variables in this study.

Key words: *Neonatal mortality rate, feeding type, Early infancy, Low birth weight.*

Breastfeeding is the ideal method for babies especially in developing countries. Artificially fed babies acquire diarrheal disturbances with ease(1) and their potential seriousness in terms of morbidity and mortality is a very strong point against artificial feeding. Diarrhea in Indian infants is a major killer, contributing upto 23% in infant mortality rate in isolation or association with other causes(2). Meagre data is available from Northern India on mortality patterns in exclusively breast fed and artificially fed babies derived from longitudinal studies. The present study was undertaken in an attempt to fill up the above stated lacuna.

Material and Methods

A longitudinal study for six months was done on 507 socio-economically matched term babies born without congenital malformations in Queen Mary's Hospital of Gandhi Memorial and Associated Hospitals, Lucknow. Gestational age of the babies was assessed on the basis of date of last menstrual period of the mother and when this was not known with certainty Ballard's modified criteria were used(3). On the basis of birth weight, babies were divided into two groups: those weighing more than 2.5 kg and those weighing 2.5 kg or less. The latter were considered as low birth weight (LBW).

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There were 273 'breast fed babies' and 234 babies were artificially fed from birth for various reasons. All the babies were given demand feedings and mothers of artificially fed babies were given instructions regarding feeding technique and hygiene repeatedly. Artificially fed babies received approximately 120-160 ml milk/kg body weight per day. Weaning instructions were given to all mothers when babies were over 4 months of age.

The first followup visit was 2 to 3 weeks after discharge from the hospital and subsequent visits were at monthly intervals. Those babies who did not turn up for two consecutive visits were contacted either by post or a home visit. Yet a sizeable number of babies were lost on followup and only 334 babies could be studied for the entire 6 months period. Those breast fed babies who switched over to artificial feeding were excluded from the study. Mortality was noted at each visit and mortality rate was calculated per 1000 live births. Neonatal mortality was further divided into early neonatal mortality for deaths occurring within first 7 days of life and late neonatal mortality for death occurring from 8th to 28th day of life. Mortality rate calculations for 1-6 months period were based on the number of babies at the start of the study. Chi-square test was applied for statistical evaluation of the data.

Results

The reasons for resorting to artificial feeding by the mothers are shown in *Table I*. They were: maternal illness (18.8%); lactation failure (24.8%) either primary (4.3%) or following cesarean section, post partum hemorrhage and eclampsia (20.5%); maternal death and separation (2.1%) and psychosocial problems in

TABLE I-- *Reasons for Artificial Feeding.*

I. *Maternal illnesses* n=44 (18.8%)	
(*a*) Rheumatic heart disease	6
(*b*) Active tuberculosis	2
(*c*) Puerperal sepsis	16
(*d*) Jaundice	5
(*e*) Psychosis	2
(*f*) Others	13
II. *Lactational failure* n=58 (24.8%)	
(*a*) Primary	10
(*b*) After cesarean section	42
(*c*) After post partum hemorrhage	4
(*d*) After eclampsia	2
III. *Maternal death/separation* n=5 (2.1%)	
IV. *Psychosocial* n=26 (11.1%)	
(*a*) Single mothers	10
(*b*) Working mothers (not willing to feed)	16
V. *Poor lactation (by self assessment)*	n=55 (23.5%)
VI. *Non specific reasons*	n=46 (19.7%)
	Total n=234

TABLE I--*Distribution of Neonates According to Birth Weight and Type of Feeding at Various Ages: A Longitudinal Followup.*

Age in mo ± 1 wk	Birth weight			
	>2.5kg		<2.5kg	
	BF	AF	BF	AF
0	201	180	72	54
1	160	150	61	44
2	168	154	61	43
3	144	140	60	41
4	126	130	58	40
5	135	110	55	36
6	129	111	56	38

BF = Breast fed; AF = Artificially fed.

mothers (11.1%); poor lactational performance as assessed by mothers themselves (23.5%) and reasons not clearly defined (19.7%).

There were 201 breast fed and 180 artificially fed babies weighing more than 2.5 kg at birth at the start of study but by the end of 6 months followup, the number was reduced to 129 and 111, respectively (*Table II*). There were 72 breast fed and 54 artificially fed low birth weight babies in the study at birth and on sixth month of follow up, only 56 breast fed and 38 artificially fed babies could be contacted (*Table II*). Percentage mortality for early and late neonatal period and 1-6 months post neonatal period are indicated in *Table III*. Artificially fed babies had higher mortality than breast fed babies for all three breakups of study period irrespective of birth weight with the exception being that no baby weighing more than 2.5 kg died during the late neonatal period. It was also uniformly found that low birth weight babies had significantly higher mortality than similarly fed babies of birth weight more than 2.5 kg at similar age groups.

Mortality rates in neonatal and 1-6 months periods are indicated in *Table IV*. The causes of infant death are given in *Table V*.

Discussion

In the present study, neonatal mortality rate for term babies was 37.5 per 1000 live births (*Table IV*), which is lower than the neonatal mortality rate of 77.7 reported from Uttar Pradesh, as this includes babies of all gestational ages(4). Irrespective of birth weight, neonatal mortality rate for term babies in the current study, was 15.8 for breast fed ones while artificially fed ones had a higher rate of 21.6.

The reasons for resorting to artificial feeding of babies are enumerated in *Table I*, and except for primary lactational failure seen in only 4.3% mothers and maternal death or separation in another 2.1%, all the rest of the causes could be prevented by adequate motivation of mothers, supervision of breast feeding and maternity leave

TABLE III -- *Percentage of Babies Dying During 0-6 Months in Relation to Birth Weight and Feeding.*

Birth weight	Neonatal mortality early		Late		1-6 months mortality	
	BF	AF	BF	AF	BF	AF
>2.5 kg	0.49 (1)	1.1* (2)	0	0	0.77 (1)	1.8* (2)
≤2.5 kg	6.94" (5)	12.96**" (7)	2.78" (2)	3.70** (2)	12.5" (7)	21.0**" (8)

P value: Comparing babies >2.5 kg or ≤2.5 kg at birth on BF versus AF *>0.05, ** <0.001
Comparing BF or AF babies with birth weight >2.5 kg versus ≤2.5 kg "<0.001
Values in parentheses give actual number.

facilities for working women.

On analysing neonatal mortality rates obtained in reference to birth weight alone, LBW term babies had significantly higher mortality than similarly fed babies weighing more than 2.5 kg at birth (*Table III*). These observations have been made by various workers time and again(5,6). In reference to feeding type, it was found that artificially fed babies had higher mortality than breast fed ones (*Table III*). Patel *et al.*(7) have also reported higher neonatal mortality in artificially fed low birth weight babies.

In the early neonatal period, the mortality in breast fed low birth weight term babies was significantly lower than that in artificially fed babies (*Table III*). In the late neonatal period, even though artificially fed low birth weight babies had higher mortality, the difference was not statistically significant.

In babies born with weight >2.5 kg, there was no mortality in late neonatal period and in early neonatal period, the mortality was unrelated to feeding type (*Table III*).

In the current study, 12.7% of low birth weight died in neonatal period, 75% of these dying in early neonatal period where the mortality appears to be unrelated to feeding type (*Table IV*). Kalra *et al.*(8) reported that 24% of babies weighing <2 kg died in the neonatal period. Hence, in aiming to reduce neonatal mortality rate, the prevalence of LBW should be reduced. Also, as artificially fed low birth weight babies have a higher mortality, these should be treated as 'higher high risk group' whatever be the cause of artificial feeding. Artificial feeding should be positively discouraged in low birth weight babies.

In the 1-6 months study period, the mortality rate of term babies was 53.8 per 1000 live births, the breast fed had a rate of 23.9 and artificially fed a higher rate of 29.9, the low birth weight babies had a mortality rate as high as 44.9 while those born with weight >2.5 kg a rate of only 9 (*Table IV*). Hence, low birth weight babies irrespective of feeding type had a significantly higher mortality than those weighing >2.5 kg at birth as reported by others (5,6). Also, breast feeding did cause reduction in mortality in this period and it was statistically significant in low birth weight babies when compared to their artificially fed counterparts (*Table III*). This important observation has not been clearly highlighted by studies from our country.

On analysing the causes of neonatal mortality, sepsis was the major cause responsible for 9 out of 19 deaths. The mortality in this period was apparently unrelated to feeding type (*Table V*).

In 1-6 months period respiratory diseases were the sole cause of death in babies weighing >2.5 kg at birth, 1 breast fed and 2 artificially fed babies died due to this.

In babies weighing <2.5 kg at birth, diarrheal disease with its complications was

TABLE IV -- *Mortality Rates in Term Babies (per 1000 Live Births).*

Sample	Mortality rates	
	Neonatal	1-6 months
Term babies	37.5 (19)	53.8 (18)
Breast fed	15.8 (8)	23.9 (8)
Artificially fed	21.6 (11)	29.9 (10)
>2.5 kg birth weight	5.9 (3)	9.0 (3)
≤2.5 kg birth weight	31.5 (16)	44.9 (15)

Values in parentheses give actual number of deaths.

TABLE V-- *Causes of Death in Infants*

Period		Breast fed		Artificially fed	
		>2.5 kg	≤2.5kg	>2.5 kg	≤2.5kg
Early neonatal					
(*a*)	Birth trauma	-	-	1 (0.6)	-
(*b*)	Asphyxia	-	1 (1.4)	-	2 (3.7)
(*c*)	Sepsis	1 (0.5)	3 (4.2)	-	3 (5.6)
(*d*)	Meningitis	-	-	1 (0.6)	1 (2.5)
(*e*)	Intra ventricular hemorrhage	-	1 (1.4)	-	-
(*f*)	Aspiration	-	-	-	1 (2.5)
Late neonatal					
(*a*)	Sepsis	-	1 (1.5)	-	1 (2.1)
(*b*)	Diarrhea	-	1 (1.5)	-	-
(*c*)	Meningitis	-	-	-	1 (2.1)
1-6 months					
(*a*)	Respiratory Illness	1 (0.7)	2 (3.6)	2 (1.8)	3 (7.9)
(*b*)	Diarrhea	-	4 (7.1)	-	5 (13.2)
(*c*)	Meningitis	-	1 (1.8)	-	-

Values in parentheses give percentages.

the dominant cause of death, 7.1% breast fed versus 13.2% artificially fed babies dying due to it. This was followed by respiratory infections, the incidence being twice as high in artificially fed than in breast fed babies (*Table V*).

The present study clearly points out the fact that in prevalent Indian hygienic conditions, neonatal and 1-6 months mortality rates even for term babies are dependent on birth weight and on feeding type. Pratinidhi *et al.*(9) in spelling out a strategy for reducing infant mortality rate rightly stressed the need for reducing infant mortality rate rightly stressed the need for reducing the incidence of low birth weight babies. This would cause an immediate reduction in neonatal mortality rate. In aiming to reduce 1-6 months mortality rate the above remedifying measure along with promotion of breast feeding especially in low birth weight babies would be effective.

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NOTES AND NEWS

Asian Pacific Congress on
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The Asian Pacific Congress on Bleeding Disorders and Transfusion Medicine–Impact on Hospital Services and Health Care is to be held from *May 11-15, 1992* at Bangkok, Thailand. For further information please contact:

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