

MORTALITY IN NEONATAL SEPTICEMIA WITH INVOLVEMENT OF MOTHER IN MANAGEMENT

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ABSTRACT

In most Special Care Neonatal Units (SCNUs) in India, mothers are excluded from the care of their sick babies for fear of overcrowding and dislocation. We have attempted to study the feasibility of involving mothers in the care of their babies admitted for neonatal septicemia and to analyse whether this changed the sepsis related case fatality rate. The study material consisted of 158 neonates with blood culture positive neonatal septicemia whose mothers were actively involved in their care during their stay in the SCNU of LNJP Hospital throughout 1987-88. The mothers lived in with their sick neonates and were extremely useful in feeding, cleaning, and monitoring for some important signs and symptoms. There were no epidemics of infection in the nursery during this period. All the babies discharged were receiving breast feeds, and the mothers were confident in taking care of them before discharge. The mortality in this group was 43%. The onset of septicemia was most often in the first week (36%) being 25.9% in second week, 26.6% in the third, and 11.4% in the fourth. Mortality was maximum (64.5%) when the onset of illness was in the first 3 days. Klebsiella and S. aureus were commonly isolated organisms (38.6 and 21.5%, respectively). Gram negative organisms were isolated in 66.5% cases with higher mortality in this group. Nearly 46% of the babies weighed 2 kg or less, with a mortal-

In a developing country like India, with the problem of limited resources and medical manpower, especially nurses and doctors, mothers can be usefully involved in the care of their sick neonates. However, in most special care neonatal units (SCNUs) in India, the mother is excluded from the care of her sick baby, and often denied entry into the nursery, perhaps fearing her presence will lead to overcrowding and dislocation(1). The present study was undertaken to assess the feasibility and utility of the involvement of mothers in the care of their septicemic babies and to analyse changes in the resultant mortality.

Material and Methods

Throughout 1987-88, 158 blood culture positive septicemic neonates admitted to the special care nursery for outborns of LNJP Hospital, New Delhi received active involvement of their mothers in their care. A detailed prenatal, natal, and post-

ity of 60.2% compared to 28.2% in those more than 2 kg. Only 3 to 5% and 40 to 66.7% of Gram negative and 23 and 70% of Gram positive organisms were sensitive to ampicillin and gentamicin, respectively.

Key words: Maternal involvement, Neonatal septicemia, Mortality, Case fatality rate.

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natal history with special emphasis on any predisposing factors for infection was taken; thorough clinical examination of each baby was done at admission and at least twice a day subsequently. Hemoglobin estimation, and total and differential counts (including polymorphonuclear band cell count) were carried out in all; urine and stool examination, radiograph of chest, and CSF examination being carried out whenever indicated clinically. Blood samples for culture of aerobic bacteria were taken at admission in all babies, with ampicillin-gentamicin being the initial antibiotics in most. Identification of the isolates was carried out as per standard criteria(2).

The outborn SCNU of LNJP Hospital is a referral unit where neonates referred from other hospitals or brought directly from home are admitted. The mothers lived in, looked after the cleaning of their babies, and if they could suck, also breast fed them. They were also instructed to look for the following important signs and symptoms(3): general activity and sucking; change in breathing; vomiting, stool pattern and frequency; frequency of passing urine; variations in temperature of baby; and any abnormal movements.

Results

During the two year study period, all the mothers were extremely useful in feeding and cleaning their babies. This left the nurse free to attend to the critically sick neonates who were in greater need of her skills. The mothers promptly reported the signs and symptoms they were asked to observe. At discharge, the babies were receiving breast feeds and their mothers were confident about taking care of them. Of 158 babies with neonatal septicemia, 68 died, giving a mortality rate of 43%. Roughly one-fifth (21.5%) neonates had associated meningitis. Nearly one-third (36%) of all cases of septicemia had onset in the first week with maximum mortality (64.5%) with onset of illness in the first 3 days (*Table I*). *Klebsiella* (38.6%) and *S. aureus* (21.5%) were the most commonly isolated organisms, with higher mortality in infections with Gram negative (63.5%) than Gram positive organisms (19.1%). The only case in which pneumococci were isolated died (*Table II*). Only 3-5% of Gram negative and 23% of Gram positive organisms were sensitive to ampicillin, while sensitivity to gentamicin ranged between 40 and 66.7 and 70% respectively.

TABLE I—Mortality in Relation to the Age of Onset of Neonatal Septicemia

Age (days)	Admissions	Deaths	Mortality (%)
0- 3	31 (19.6)	20 (29.4)	64.5
4- 7	26 (16.4)	8 (11.8)	30.8
8-14	41 (25.9)	23 (33.8)	56.1
15-21	42 (26.6)	9 (13.2)	21.4
22-28	18 (11.4)	8 (11.8)	44.4
Total	158	68	43.0

Figures in parentheses indicate percentages.

TABLE II—Blood Culture Isolates and Mortality

Bacteria	Admissions	Deaths	Mortality (%)
<i>Klebsiella</i>	61 (38.6)	33 (48.5)	54.1
<i>S. aureus</i>	34 (21.5)	9 (13.2)	26.5
<i>E. coli</i>	18 (11.4)	6 (8.8)	33.3
Coagulase negative staphylococci	13 (8.2)	5 (7.3)	38.5
<i>Pseudomonas</i>	101 (6.3)	7 (10.3)	70.0
<i>S. typhimurium</i>	10 (6.3)	4 (5.9)	40.0
<i>Proteus</i>	2 (1.3)	1 (1.5)	50.0
<i>Acinetobacter</i>	2 (1.3)	1 (1.5)	50.0
Alpha-hemolytic streptococci	1 (0.6)	0 (0)	0.0
Beta-hemolytic streptococci	4 (2.5)	1 (1.5)	25.0
Pneumococci	1 (0.6)	1 (1.5)	100.0
<i>M. polymorpha</i>	2 (1.3)	0 (0)	0.0

Figures in parentheses indicate percentages.

Klebsiella isolates showed a very high incidence of multiple antibiotic resistance; only 39.3% were sensitive to gentamicin (*Table III*). Weight of the babies was 2 kg or less in 46.2% and 2.5 kg or less in 72.2%. Mortality was 60.2% in babies weighing 2 kg or less as compared to 28.2% in those more than 2 kg. It was 50% in babies weighing 2.5 kg or less as compared to 25% in those weighing more.

There were no epidemics of infection in the nursery during this period.

Discussion

Case fatality rate in culture positive neonatal sepsis in the present series was 43%, which compares well with and in fact is rather less than the results of other centres in India in the last decade (*Table IV*). There were no epidemics of infection, partly because the urine and stool of each baby were handled by a separate person,

the mother, minimizing the chances of cross infection. It is surprising that in spite of the shortage of nurses, in most SCNUs the mother is not admitted along with the sick neonate or even allowed to visit her infant. It has been shown that mothers who were not allowed to visit their babies were significantly more anxious than rooming in mothers with significant reduction in their anxiety on being allowed to visit(1). The notion that the policy of allowing mothers in the nursery will create logistic problems due to overcrowding and dislocation is dispelled by our study. Involving the mother in the care of her sick neonate will be very useful with our problem of limited resources and nursing staff. The mother is the best monitor and the most committed nurse, at the same time enabling the nurse to be available for critically sick neonates in greater need of her skills. On discharge, the mother is able to breast feed and handle the baby confidently.

TABLE III—Sensitivity of Bacterial Isolates to Antibiotics

Bacteria	No.	Strepto	Kana	Genta	Ampi
Gram negative					
<i>Klebsiella</i>	61	17 (27.9)	13 (21.3)	24 (39.3)	2 (3.3)
<i>E. coli</i>	18	9 (50)	9 (50)	12 (66.7)	1 (5.6)
<i>Pseudomonas</i>	10	4 (40)	0 (0)	5 (50)	0 (0)
<i>S. typhimurium</i>	10	1 (10)	2 (20)	4 (40)	0 (0)
Gram positive					
<i>S. aureus</i>	34	13 (38.2)	3 (8.8)	24 (70.6)	8 (23.5)
Coagulase negative staphylococci	13	5 (38.5)	1 (7.7)	9 (69.2)	3 (23.1)

Figures in parentheses indicate percentages.

TABLE IV—Mortality in Different Studies on Neonatal Septicemia

Author	No. of cases	Culture-positive (%)	Mortality (%)
Saxena <i>et al.</i> (10)	98	74.3	52.0
Mishra <i>et al.</i> (6)	120	100.0	61.7
Khatua <i>et al.</i> (4)	55	100.0	69.1
Sinha <i>et al.</i> (7)	55	100.0	62.0
Sharma <i>et al.</i> (13)	2784	56.0	45.1
Chugh <i>et al.</i> (12)	45	100.0	53.3
Present study	158	100.0	43.0

The mortality in neonatal septicemia is higher in blood culture positive cases(4), when meningitis is associated and when causative organisms are resistant to antibiotics being used(5). Meningitis was associated in 21.5% cases in the present study. A number of Indian series on neonatal sepsis had a low incidence(3-8) of associated meningitis(6-9). However in the series reported by Saxena *et al.*(10) from our centre meningitis was associated in 27.5% cases of neonatal sepsis in 1977-78. Monga

et al.(11) found associated meningitis in 15% in 1981 and 28% in 1984.

We found only 3.3% of *Klebsiella* isolates sensitive to ampicillin and 39.3% sensitive to gentamicin. Hitherto reported sensitivity of *Klebsiella* isolates to ampicillin has ranged from 0 to 7%(4,8,11,12).

Sensitivity of *Klebsiella* isolates to gentamicin has been very low in the present study. It has ranged from 81.8 to 100% in earlier studies(4,8,9,12). Sensitivity of *S. aureus* isolates to ampicillin and gentami-

cin was 23.5 and 70.6%, respectively in the present study. Sensitivity of Staphylococci has been reported to be 45.8 and 61.8% (11) for ampicillin and 80-100% for gentamicin (6,8). Monga *et al.* (11) reported a decline in sensitivity to gentamicin of staphylococci from 87.5 to 70.4% and of Klebsiella from 81.8 to 42.7% from 1981 to 1984 (11).

We could not have a control group in which the mother was not involved in the care of her baby because of shortage of nurses. However, it is clear (*Table IV*) that the presence of mothers in the SCNU poses no additional risk of mortality to the sick neonates, and may in fact actually reduce it. This aspect of neonatal care, whose benefits have been discussed at length by Karan (3), can be adopted at all levels of neonatal care in developing countries. It is suggested that further studies on involvement of the mother in the care of her sick baby be conducted in adequately staffed nurseries presently not involving the mother and include a control group.

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