

**LATE ONSET SEPSIS IN NEWBORNS WITH INCIDENCE OF MENINGITIS.****Dr. Sudhir Mehta\***

MBBS, DCH, DNB (PEDIATRICS)

Department of Pediatrics, Sri Aurobindo Medical College and PG Institute, Indore, Madhya Pradesh, India.

**Corresponding Author Dr. Sudhir Mehta**

MBBS, DCH, DNB (PEDIATRICS) Department of Pediatrics, Sri Aurobindo medical college and PG Institute, Indore, Madhya Pradesh, India.

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**ABSTRACT**

**Background:** Bacterial sepsis and meningitis continue to be major causes of morbidity and mortality in newborns, particularly in premature infants. The present study was undertaken to know the incidence of meningitis in neonates with late onset sepsis. **Methods:** Hospital based observational study, conducted for a period of one year. 118 neonates fulfilling the inclusion criteria were included and subjected to detailed history, clinical examination followed by investigations. **Results:** The annual incidence of meningitis in LOS was 17. The majority of patients (50%) presented in the age group of 3-7 days. The mean weight of neonates was  $2.51 \pm 0.508$  kg. 58% of neonates with meningitis were of low birth weight ( $P < 0.005$ ). 60.6% of preterms with LOS had meningitis as against 35% for terms ( $P < 0.005$ ). 59.4% Females had meningitis as against 40.6% males ( $P > 0.005$ ). In meningitis cases 100% cases were lethargic; decreased feeding in 60%, seizures in 52.8%, fever in 40%. Blood culture was positive in 49.6% cases of meningitis. Meningitis was seen in 66.7% of proven gram negative sepsis as against 33.7% cases of proven gram positive sepsis ( $P < 0.005$ ). 20.6% cases of meningitis had mortality as against 5.8% in those who had sepsis but no meningitis ( $P < 0.005$ ). **Conclusions:** Meningitis is common in late onset sepsis, associated with high mortality.

**KEYWORDS:** Meningitis, LOS, Preterm.**INTRODUCTION**

Neonatal infections are important causes of mortality and morbidity in newborn infants all over the world including the industrialized countries with high hygienic standards, deliveries at hospitals, access to antimicrobial agents for prophylaxis, treatment and facilities for advanced intensive care. Most studies of incidence and etiology of neonatal sepsis and meningitis come from these countries, while there is a lack of data from the developing countries where the mortality and morbidity are probably immense. Sepsis is responsible for about 30-50% of the total neonatal deaths in developing countries.<sup>[1,2]</sup> Various community and hospital based studies report sepsis as a cause of neonatal death in 20-50% of cases.<sup>[3,4]</sup> Culture proven sepsis may occur in upto 20% of NICU admissions.<sup>[5]</sup> The incidence of neonatal sepsis according to the data from National neonatal perinatal database.<sup>[6]</sup> is 30 per 1000 live births. The database comprising 18 tertiary care neonatal units across India found sepsis to be one of the commonest causes of neonatal mortality contributing to 19% of all neonatal deaths.<sup>[6,7]</sup> Septicemia was the commonest clinical category with an incidence of signs and symptoms of infection with or without accompanying bacteremia in the first month of life. It encompasses various systemic infections of the newborn such as septicemia, meningitis, pneumonia, arthritis,

osteomyelitis and urinary tract infections. There is no consensus on how to classify neonatal sepsis and meningitis in periods after birth. Early and late onset sepsis has been reported as occurring before or after 48 hours of age,<sup>[8]</sup> 72 hours of age,<sup>[9,10]</sup> or 96 hours of age.<sup>[11-13]</sup>

The first week of life is often reported as early onset sepsis with a subgroup of infections that develop during the first 24 hours of life called very early onset infections.<sup>[14-17]</sup> Late onset infections occur during the second to fourth weeks of life while infections from day 28-30 to day 120-180 are called very late onset infections. For all practical purposes in the subsequent discussion, neonatal septicemia is classified as Early Onset Septicemia (EOS): It presents within 72 hours of life.<sup>[9,10,18-20]</sup> Late onset septicemia: It usually presents after 72 hours of age.<sup>[18]</sup>

Any newborn with bacterial sepsis is also at risk of meningitis. As such the incidence of meningitis in neonatal sepsis has varied from 0.3-3% in various studies but late onset septicemia has been reported to be fairly associated with meningitis; with percentage ranging from 3 to 30%.<sup>[18,21-25]</sup> In cases of LOS, LP should be done in all infants prior to starting antibiotics. LP could be

postponed in a critically sick neonate but should be performed once the clinical condition stabilizes.

This study is being done to estimate the incidence of meningitis in late onset sepsis so as to reduce mortality and morbidity

#### MATERIAL AND METHODS

This hospital based observational study was conducted from 2013 to 2014 for a period of one year on the neonates older than 72 hours admitted with signs and symptoms suggestive of sepsis with positive sepsis screen. Neonates with any other congenital malformation and very sick neonates were excluded from study. In each neonate with clinical features of sepsis, a detailed history and examination was done. Neonates with features of sepsis and positive CRP (was done as a qualitative estimation as positive/negative with the help of latex slide agglutination test) were subjected to blood culture and CSF examination. The data has been analysed with the help of computer software Epi-Info version 6.0.1 and SPSS 10.0 for Windows. Chi-square test was used to ascertain statistical significance among the proportions. Incidence along with 95% confidence limits was calculated to express magnitude. Odd's ratio with 95% confidence limits was estimated vis a vis the presence or absence of meningitis in late onset neonatal sepsis. A P value of <0.05 was considered as statistically significant unless proved otherwise. Confounding factors were dealt with appropriate methods of adjustment.

#### RESULTS

Study group comprised of 118 cases. It included those neonates who satisfied the inclusion criteria and Incidence of meningitis was studied in them. The annual incidence of meningitis in LOS was 17. The majority of patients (50%) presented in the age group of 3-7 days. The mean weight of neonates was  $2.51 \pm 0.508$  kg. 58% of neonates with meningitis were of low birth weight ( $P < 0.005$ ). 60.6% of preterms with LOS had meningitis as against 35.2% for terms ( $P < 0.005$ ). 59.4% Females had meningitis as against 40.6% males ( $P > 0.005$ ) [Table 1]. In meningitis cases 100% cases were lethargic; decreased feeding in 60%, seizures in 52.8%, fever in 40%. Blood culture was positive in 49.6% cases of meningitis. Meningitis was seen in 66.7% of proven gram negative sepsis as against 33.7% cases of proven gram positive sepsis ( $P < 0.005$ ). 20.6% cases of meningitis had mortality as against 5.8% in those who had sepsis but no meningitis ( $P < 0.005$ ). The commonest isolate recovered was Klebsiella followed by MRSA, Acinetobacter and coagulase negative Staphylococcus.[Table 2]

**Table 1: Distribution of meningitis based on Gender, Gestation & Birth-weight**

Female/male %	59.4/40.6
PRETERM/TERM %	60.6/40.4
<2.5 kg %	58
>2.5 kg %	42

**TABLE 2: Showing the microorganisms isolated from the blood cultures of septic neonates**

Organism	Percentage %
Klebsiella	34
MRSA	22
Acinetobacter	18
CONS	12
Ecoli	9
Enterbacter	5

#### DISCUSSION

Neonatal sepsis is one of the commonest causes of neonatal morbidity and mortality. Near about 0.3-3% of neonates with sepsis do have meningitis but in case of LOS, the incidence of meningitis is higher, even upto 30%. The overlapping clinical manifestations of septicemia and meningitis make it very difficult to differentiate a neonate with meningitis from the one with septicemia alone as meningitis is associated with much more mortality and morbidity, it is always better to have a high suspicion for meningitis while treating neonates with septicemia. The incidence of meningitis in LOS in our study was 17%. Similar observation was reported by Visser et al.<sup>[26]</sup> where 24% septic neonates with LOS had meningitis. Laving et al.,<sup>[27]</sup> Anjos De Silva et al.<sup>[28]</sup> and Tisukumara et al. (2009).<sup>[29]</sup> reported prevalence of meningitis in neonates with late onset sepsis as 17.9%, 17% and 17.2% respectively.

The LBW neonates with sepsis accounted for 58% and preterms with sepsis accounted for 36.4%. However meningitis was observed in 58% of LBW neonates and 60.6% of preterm neonates. This high incidence of meningitis in LBW and especially preterm has also been reported by Longe et al.,<sup>[30]</sup> Moreno et al.<sup>[31]</sup> and Jiang et al.,<sup>[32]</sup> observed that LOS was significantly more common in VLBW and preterm neonates. Female to male ratio in sepsis was 1.5:1, was different from observations made by Laving et al.,<sup>[27]</sup> Jiang et al.,<sup>[32]</sup> and Gheibi et al.,<sup>[33]</sup>

The neonates with meningitis in the present study had diverse signs and symptoms with lethargy predominating in 100% cases followed by decreased feeding in 60%, seizures in 52.8%, fever in 40%. Laving et al., also reported feed intolerance and lethargy as most common clinical features in meningitis, present in 73.3% and 60% cases respectively. Blood culture was positive in 49.6% cases of meningitis. Meningitis was seen in 66.7% of proven gram negative sepsis as against 33.7% cases of proven gram positive sepsis. In their study Moreno et al.,<sup>[31]</sup> Greenberg et al., and Tisukumara et al.,<sup>[29]</sup> reported that Gram positive organisms contributed to the culture positive isolates in 39%, 41% and 53.4% respectively whereas Gram negative organisms contributed to the same in 61%, 59% and 46.6% respectively. The commonest isolate recovered was Klebsiella followed by MRSA, Acinetobacter and coagulase negative Staphylococcus in our study. Moreno

et al., observed that the commonest gram negative isolates were Klebsiella and E. coli whereas Zhu et al.,<sup>[34]</sup> Khassawneh et al.,<sup>[35]</sup> Sundaram et al. and Tisukumara et al.,<sup>[29]</sup> reported Klebsiella as the most common Gram negative isolate were similar to the observations made in our study. 20.6% cases of meningitis had mortality as against 5.8% in those who had sepsis but no meningitis in the present study which is similar to the observations made by Tisukumara et al.<sup>[29]</sup> who observed that meningitis was associated with a mortality of 20% in his study. A much higher mortality rate in the meningitis group i.e. 37.7% and 37.5% was reported by Longe et al.<sup>[30]</sup>

**CONCLUSION:** Incidence as high as 17% of meningitis in neonates with LOS in the present study, endorses the need of doing a.

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**Conflict of interest:** None declared lumbar puncture in all the neonates with LOS, before starting antibiotics.

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