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NEONATAL SEPSIS-CLINICAL PRESENTATION, RISKFACTORS, MANAGEMENT AND OUTCOME

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Abstract:

OBJECTIVE: Sepsis accounts for 30-50% of all neonatal fatalities annually in underdeveloped nations, blood cultures in newborn septicemia are not usually positive. Neonatal septicemia should be diagnosed using a combination of clinical hematological and other microbiological data. In this study our aim is to find out how neonatal sepsis present clinically and what are the risk factors associated with sepsis in neonates, how to manage neonatal sepsis and outcome

METHODOLOGY:

Our study is Prospective, Observational, Hospital based Clinical study. Conducted in Pediatric Intensive care unit of Government General Hospital attached to Kurnool Medical College, Kurnool. The sample was collected based on inclusion and exclusion criteria.

CONCLUSION:

Neonatal sepsis undoubtably is a significant cause of neonatal mortality regardless of onset of sepsis, hence all the efforts should be taken towards controlling infection in indisposed neonates. Local microbiological data base like antibiogram should be carefully updated regularly to provide information to clinicians in effective management of sepsis.

Key words: *National Neonatal Perinatal Database (NNPD), Interleukin-6 (IL-6)*

I. INTRODUCTION

The most frequent cause of newborn mortality. Systemic infections in newborns, including septicemia, pneumonia, meningitis, arthritis, osteomyelitis, and urinary tract infections, are referred to as neonatal sepsis. Neonatal sepsis occurred at a rate of 30 per 1000 live births in India, according to the National Neonatal Perinatal Database (NNPD) during the years 2002–2003. Neonatal sepsis's early symptoms are ill-defined and hazy. ECG heart rate analysis and colorimetric skin color analysis are two novel methods for diagnosing newborn sepsis. The gold standard for the diagnosis of sepsis is a blood culture, however culture results aren't available for 48–72 hours. Avoiding the overuse of antibiotics to treat infants who are not ill is essential in this age of multidrug resistance. Consequently, quick diagnostic tests that distinguish between infected and non-infected children, particularly in the early new1born period, such as interleukin-6 (IL-6), neutrophil CD64 index, procalcitonin, and nucleated RBC count, have the potential to significantly influence neonatal treatment. Blood cultures in newborn septicemia are not usually positive. Neonatal septicemia should be diagnosed using a combination of clinical, hematological, and other microbiological data (colony morphology, Gram staining, biochemical characteristics, and sensitivity in the antibiogram). In India, the incidence of systemic infection among intramural babies is 3%, with septicemia present in three-quarters of cases and pneumonia in one-third of neonates1. Infection is the leading cause of death in 18.6% of intramural neonates, with Klebsiella pneumoniae (32.5%) being the most common bacterial isolate,

followed by Staphylococcus aureus (13.6%). Sepsis is 12 times more common in extramural admissions, with Klebsiella being the most common bacteria responsible (27.5%), followed by S. aureus (14.9%). Sepsis is to blame for the deaths of 38.0% of these extramural babies. A higher incidence of 35.5/1000 admissions were reported in a recent study from India. Other population-based studies in rural India have found clinical sepsis rates ranging from 49 to 170/1000 live births. The incidence of neonatal sepsis varies geographically, with Africa and Asia having the highest rates (23-38/1000 live births) and countries such as the United States and Australia having the lowest rates (1.5-3.5/1000 live births). The incidence of neonatal sepsis in South America and the Caribbean ranges between 3.5 and 8.9/1000 live births, while reported rates in Mexico range between 4 and 15.4/1000 live births.

RESEARCH METHODOLOGY

STUDY DESIGN: Prospective, Descriptive, Cross-sectional, Observational, Hospital-based Clinical study.
STUDY SITE: The Pediatric Intensive care unit of Government General Hospital attached to Kurnool Medical College, Kurnool.
STUDY DURATION: The present study was conducted from October 2022 to march 2023
SAMPLE SIZE: During the study a total of 100 Cases were collected
STUDY MATERIAL: patient data collection proforma
INCLUSION CRITERIA:

1. Presence of 1 or more established clinical features like Fever, Hypothermia, Reduced Activity, Poor Feeding, Apnoeic Respiration, Hepatosplenomegaly, Abdominal Distention, Vomiting, Diarrhoea, Seizures, Signs of circulatory or respiratory dysfunction
2. More than 2 positive laboratory criteria:

- Total leukocyte count (< 5000/ cumm), Absolute neutrophil count (0.2)
- Micro-ESR (>15 per 1hr), CRP (>0.6 microgram/ml), CSF, urine culture, Positive blood

EXCLUSION CRITERIA:

- Neonates with clinical symptoms but explained by other diseases.
- Laboratory test of less than 2 positive lab tests

METHOD OF DATA COLLECTION: Data regarding clinical presentation, risk factors, management, and outcome will be collected in a pre-structured proforma.

IV. RESULTS AND DISCUSSION

A total of 104 cases of neonatal sepsis were collected in our study, the no. of 60 (57.69%) is EOS, and 44(42.3%) are LOS

Table 1: Distribution of los & eos among sepsis

Type of sepsis	Number of cases (n=104)	percentage%
EOS	60	57.69
LOS	44	42.3

Among 104 neonates, 61 are male (58.65%) and 43 are female (41.34%)

Table 2: Distribution of sample based on the gender

Gender	Number of cases (n=104)	percentage%
Male	61	58.65
Female	43	41.34

Among 104 neonatal sepsis cases, 81 are LBW (77.88%) and 64 Gestational ages <37 (61.53%) are major Risk Factors observed in our study

Table 3: Neonatal risk factors for sepsis

Neonatal Risk Factors		Number	Percent
Birth Weight	NBW	23	22.11
	LBW	81	77.88
Gestational Age	<37	64	61.53
	>37	40	38.46
Immunization	Given	62	59.61
	Not given	42	40.38
Resuscitation	Done	36	34.61
	Not Done	68	65.38
Pre lacteal Feeds	Given	41	39.42
	Not Given	63	60.57
Rooming In	Done	10	9.61
	Not Done	94	90.38

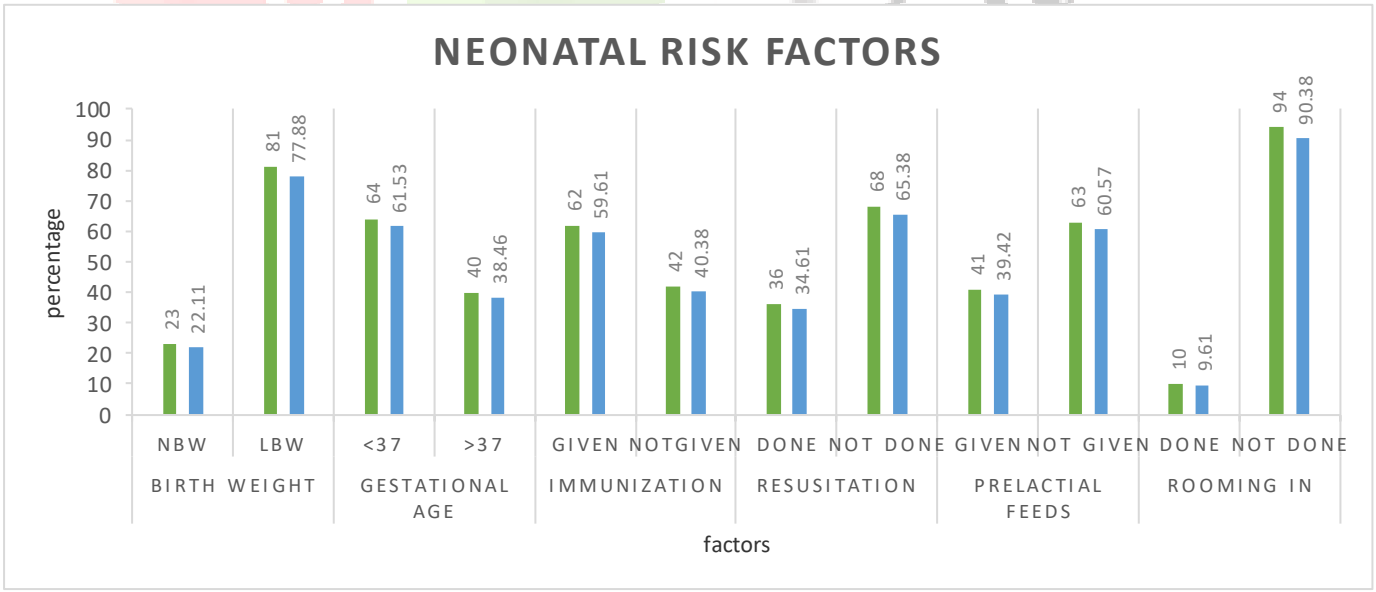

Fig 1: Neonatal risk factors for sepsis

Birth weight is divided into NBW (>2.5kgs), LBW (2.5-1.9kgs), VLBW (1.5-kg.), and ELBW(<1kg) as shown in the table below.

Table 4: distribution of sample according to birth weight

Birth Weight (In Kgs)	Number Of Cases (N=104)	Percentage%
NBW (>2.5)	23	22.11
LBW (2.5-1.5)	24	32.69
VLBW (1.5-1)	38	36.5
ELBW (<1)	9	8.65

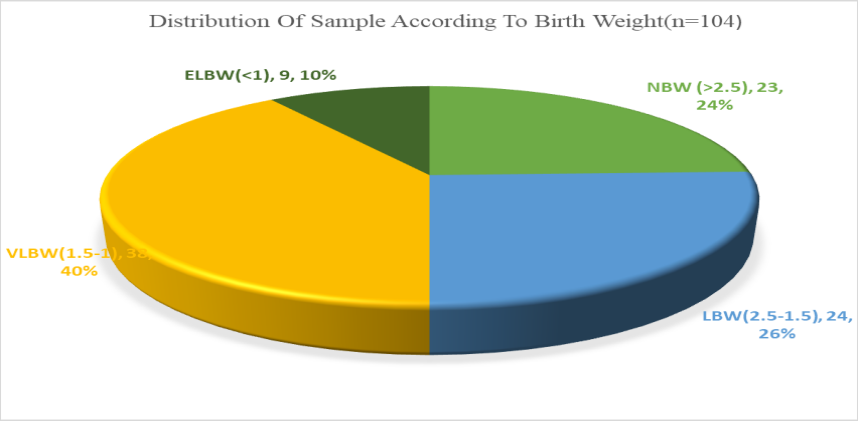

Fig 2: Distribution of sample according to birth weight

Gestational age is divided into (<37weeks) preterm, (37-42weeks) term, (>42weeks) post-term

Table 5: Distribution of sample according to gestational age

Gestational age (in weeks)	Number of cases (n=104)	Percentage%
(<37weeks) preterm	64	61.53
(37-42weeks) term	40	38.46
(>42weeks) post term	0	0

Among 104 neonatal sepsis cases, 100 no. of mothers age between 18-35 (96.15%)

Table 6: Maternal risk factors for sepsis (mother's age)

Mothers age [in years]	Number	Percent%
<18	2	1.92
18-35	100	96.15
>35	2	1.92

Table 7: Maternal risk factors for sepsis (mother's height & weight)

Maternal risk factors		Number	Percent%
Height	<145	8	7.96
	>145	96	92.3
Mothers Weight	<40	4	3.84
	>40	100	96.3

In our study majority were Low social economic status 87(83.65%)

Table 8: maternal risk factor for sepsis (social economic status)

Socioeconomic Status	Number	Percent%
Low	87	83.65
Middle	17	16.34
High	0	0

Among 104 neonatal sepsis cases, the major maternal risk factors were Frequent Vaginal Examination 24(23. 04%) and meconium stained 20(19.23%)

Table 9: Maternal risk factors for sepsis

Maternal Risk Factors		Number	Percent%
Meconium Stained	YES	20	19.23
	NO	84	80.76
Frequent Vaginal Examination	YES	24	23.04
	NO	80	76.92
Prolonged Labor	YES	8	7.69
	NO	96	92.3
Premature rupture of membrane (PROM)	YES	19	18.26
	NO	85	81.73
Foul Smelling Liquor	YES	1	0.96
	NO	103	99.03

Maternal Fever	YES	2	1.92
	NO	102	98.07

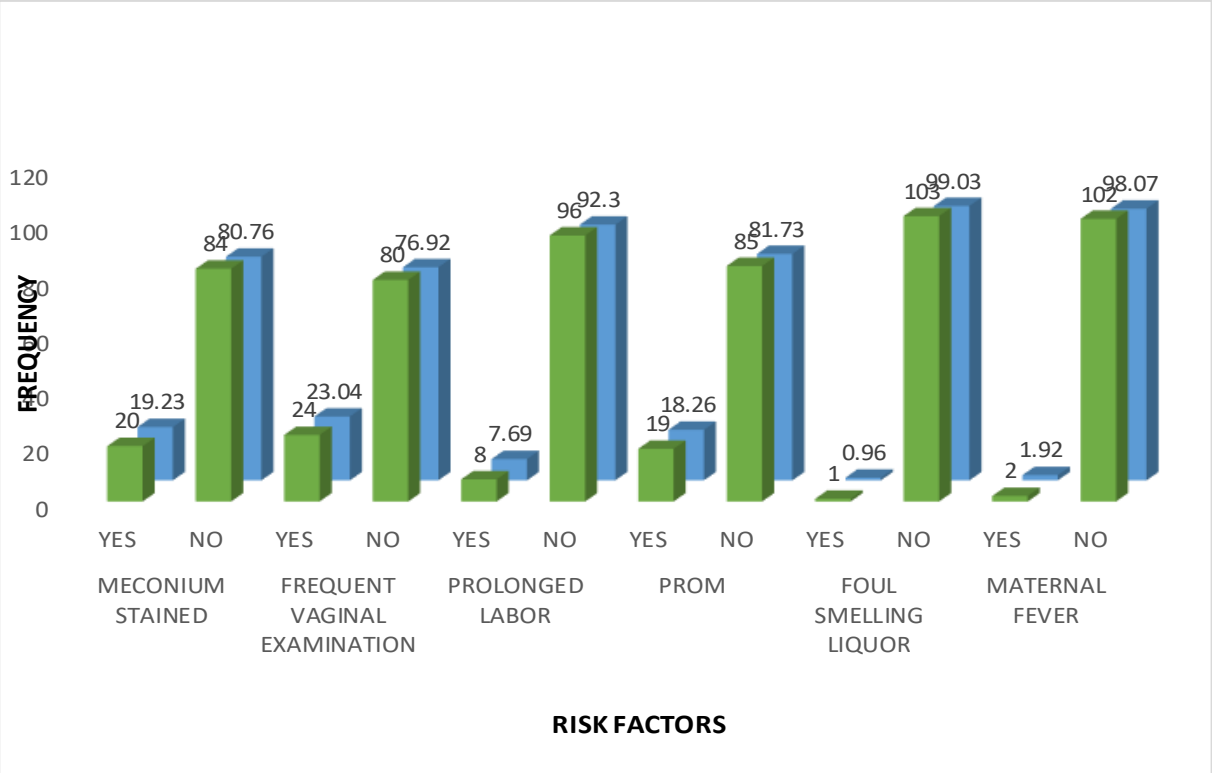

Fig 3: Maternal risk factors for sepsis

Among 104 neonatal sepsis cases, Hypertension 13(12.5) was considered a major risk factor for neonatal sepsis

Table 10: Maternal diseases that are considered risk factors for sepsis

Maternal diseases	**Number of cases (n=104)**	**percentage%**
Hypertension	13	12.5
Thyroid	7	6.73
Anemia	1	0.96
pre-eclampsia	1	0.96
Eclampsia	1	0.96
UTI	1	0.96
Normal	80	76.92

In our study, the majority of clinical presentations for sepsis are Lethargy (73.07), Respiratory Distress (41.3), Poor sucking (35.57), and Tachypnoea (35.57)

Table 11: Distribution of sample according to clinical presentation

clinical presentation	sample n=104	percent %
Apnea	10	9.61
Lethargic	76	73.07
Grunting	28	26.92
Fever	20	19.23
Hypothermia	11	10.54
Vomiting	9	8.65
Diarrhoea	4	3.84
Perinatal Hypoxia	15	14.4
Respiratory Distress	43	41.3
Congenital Pneumonia	7	6.7
Meconium-Stained Cord	19	18.26
Sucking (Poor)	37	35.57
Respiratory Apnea	10	9.61
Unexplained Weight Loss	19	18.26
Seizures	22	21.15
Cyanosis	12	11.53
Abdominal Distention	4	3.8
Tachypnoea	37	35.57
Irritable	33	31.7

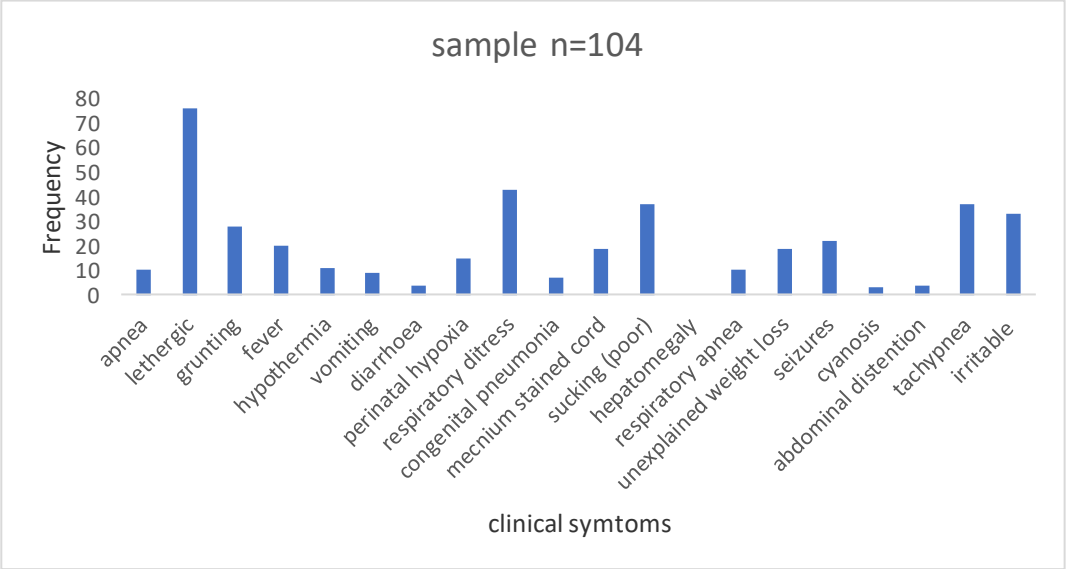

Fig 4: Distribution of sample according to clinical presentation

In our study, the capillary refill time <3 sec (94.32%) is greater among 104 sepsis cases

Table 12: distribution of sample according to clinical presentation (capillary refill time)

Capillary Refill Time	Sample N=104	Percent %
<3 sec	98	94.23
>3 sec	6	5.76%

In our study 10 Peripheral Cyanosis (9.61%) was observed among 104 sepsis cases

Table 13: Distribution of sample according to clinical presentation(color)

Clinical Presentation	Sample N=104	Percent %
Pink	88	84.61
Pale	5	4.8
Peripheral Cyanosis	10	9.61
Central Cyanosis	2	1.92

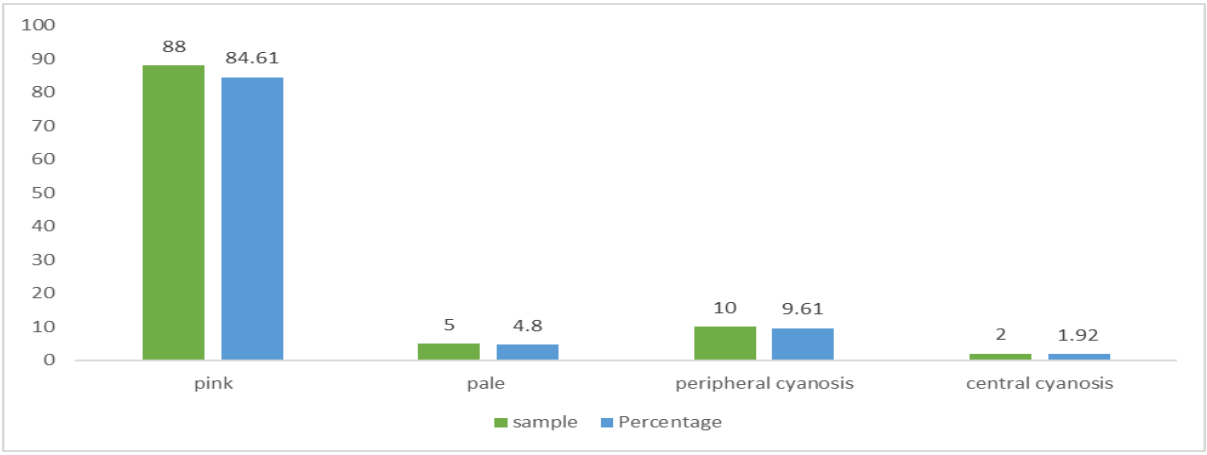

Fig 5: Distribution of sample according to clinical presentation(color)

Table 14: Distribution of sample according to clinical presentation(umbilicus)

Umbilicus	**sample (n=104)**	**percent %**
Normal	101	97.11
Red	3	2.88
Discharge	0	0

In our study, the major outline of sepsis screening in neonatal sepsis is C-Reactive Protein (82.69%), Total Leukocyte Count (42.3%), Culture-Positive Sepsis (25%)

Table 15: Outline of sepsis screening in neonatal sepsis

Sepsis Screen	**(N=104)**	**Percentage%**
Total Leukocyte Count	44	42.3
Absolute Neutrophils	2	1.92
Immature To Total Neutrophil Ration	3	2.88
C-Reactive Protein	86	82.69
Culture-Positive Sepsis	26	25
Micro ESR	0	0
Positive CSF Culture	0	0
Positive Urine Culture	0	0

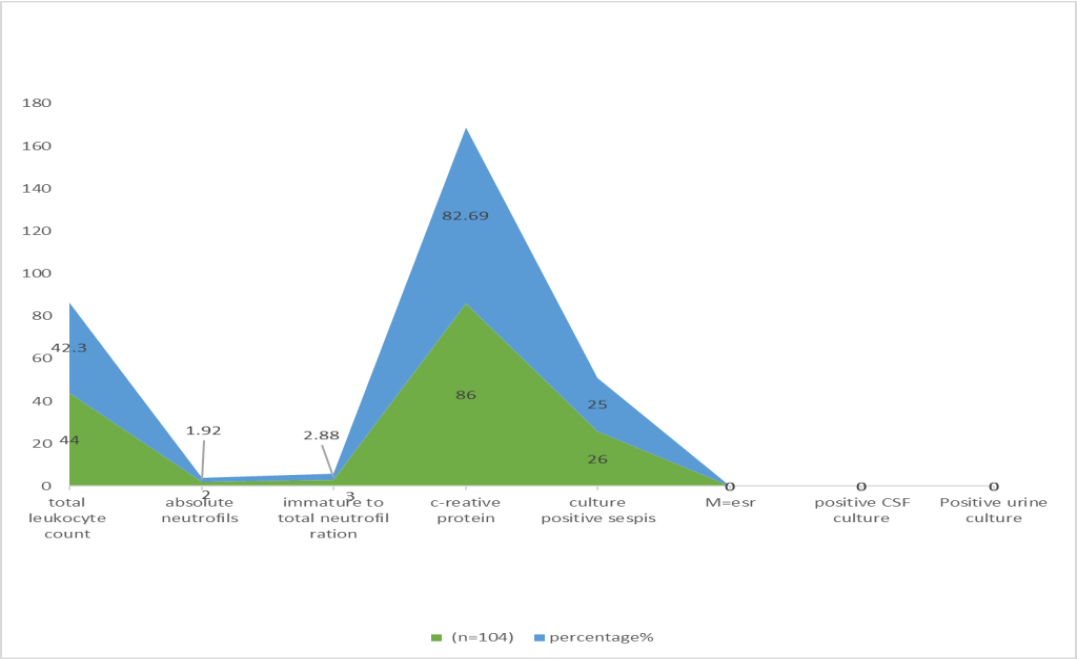

Fig 6: Outline of sepsis screening in neonatal sepsis

Table 16: management of sepsis

Treatment	(N=104)	Percentage%
Antibiotics	104	100
Thermoneutral Zone	102	98.07
Intravenous Fluids	84	80.76
Oxygen Inhalation	83	79.8
Ventilation	5	4.8
Vitamin K	37	35.57

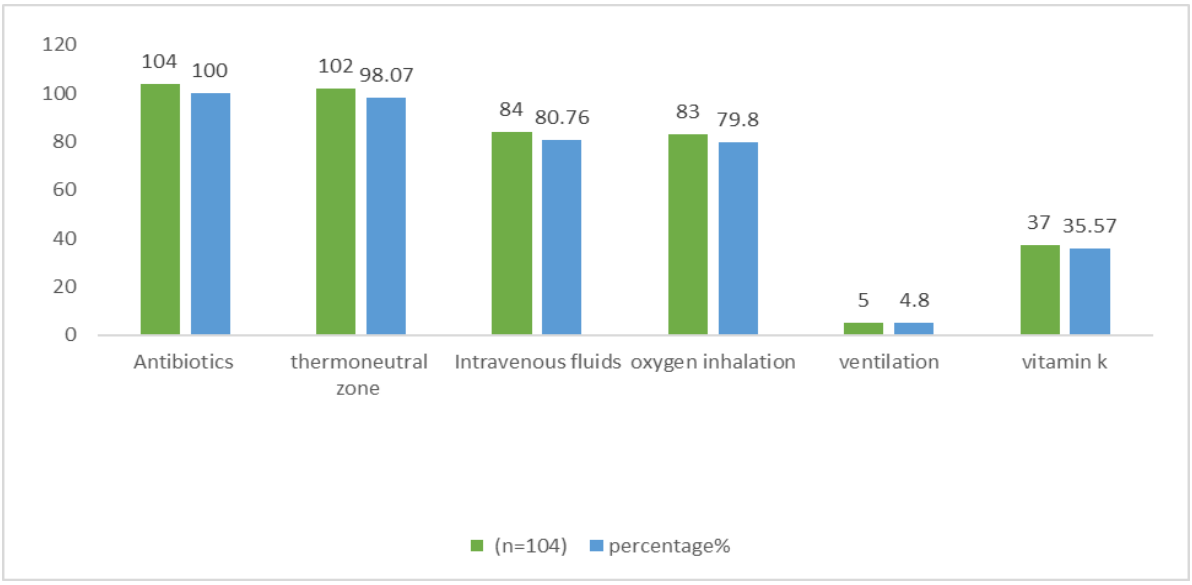

Fig 7: Management of sepsis

In our study, the mostly prescribed antibiotic is Cefotaxime 87(79.8%)

Table 17: Distribution of antibiotics prescribed

Prescribed Antibiotics	No. Of Antibiotics	Percentage
Meropenem	37	35.57
Vancomycin	35	33.65
Cefixime	2	1.69
Amikacin	75	72.11
Cefotaxime	83	79.8
Piptaz	36	34.61
Metrogyl	2	1.92

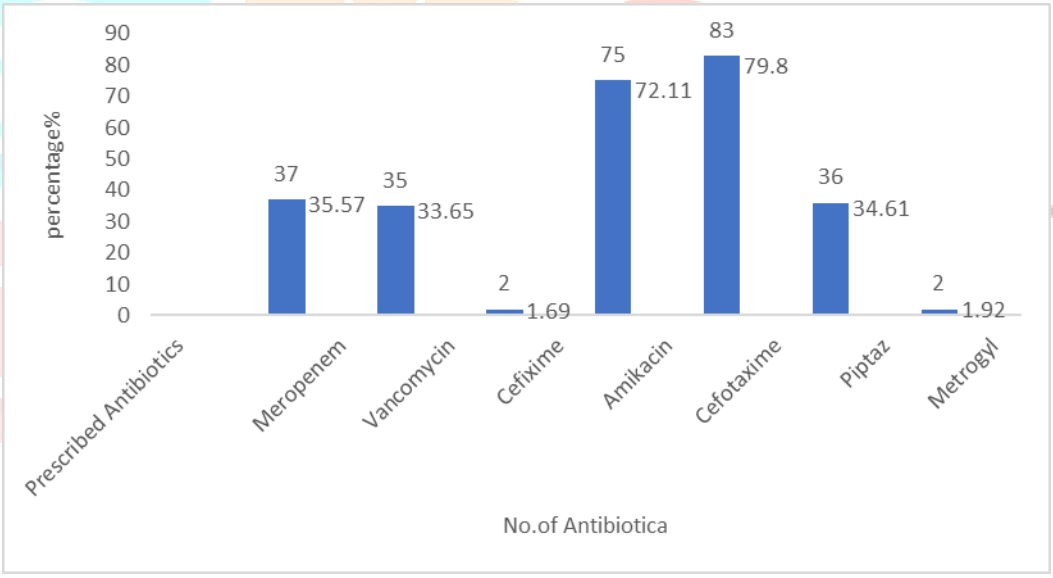

Fig 8: Distribution of antibiotics prescribed

Table 18: Distribution of antibiotics via category

Antibiotic Category	No. of Antibiotics	Percentage
Carbapenem	37	35.57
Glycopeptide	35	33.65
Cephalosporin	85	81.73
Aminoglycoside	75	72.11
Penicillin	36	34.61
Nitroimidazoles	2	1.92

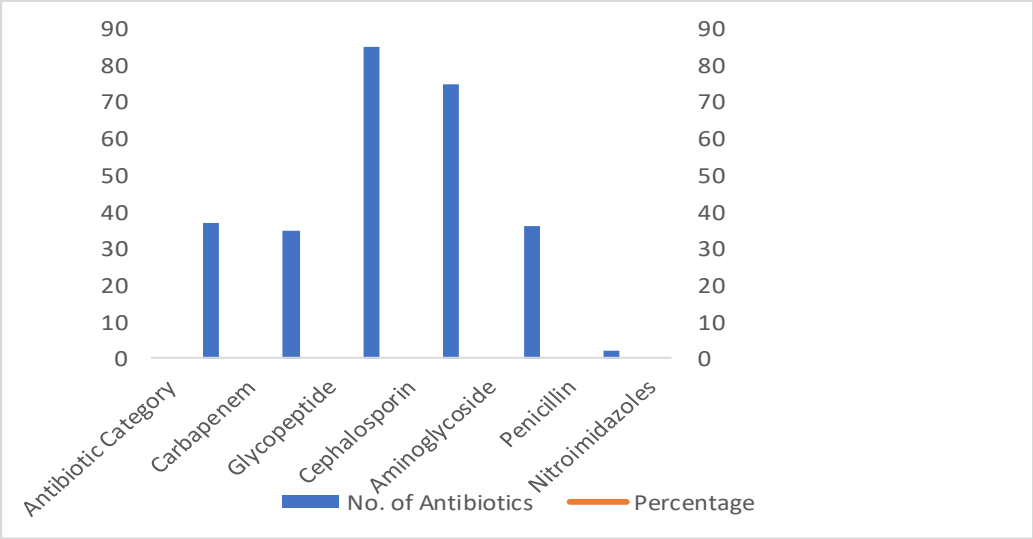

Fig 9: Distribution of antibiotics via category

Table 19: Distribution of cases based on the outcome

Outcome	Sample N=104	Percentage %
Discharged Successfully	82	78.84
Discharged With Sequelae	5	4.8
Death	17	16.34

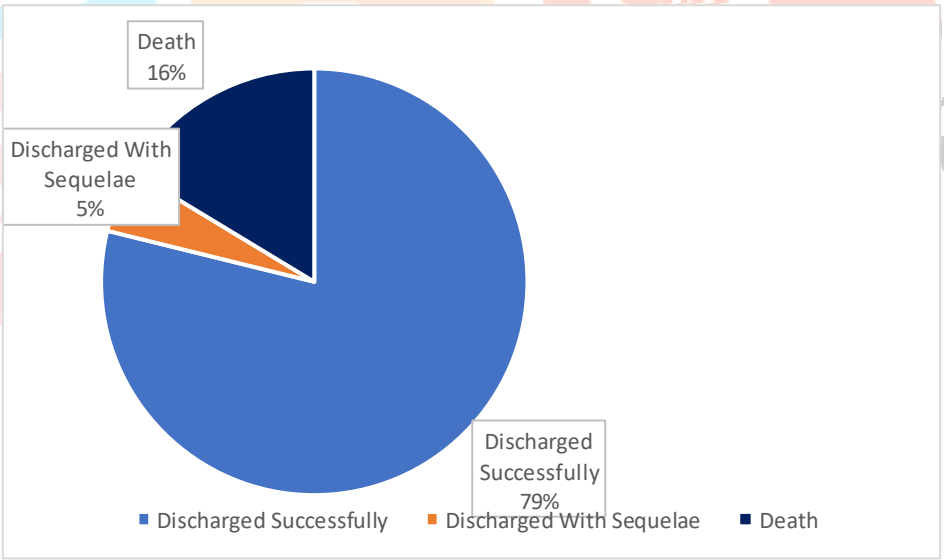

Fig 10: Distribution of cases based on outcome

Among 104 sepsis cases, 12 deaths in EOS (7. 58)% are observed

Table 20: Distribution of death cases based on the type of sepsis

Type of sepsis	Death n=17	Percent%
EOS	12	70.58
LOS	5	29.4

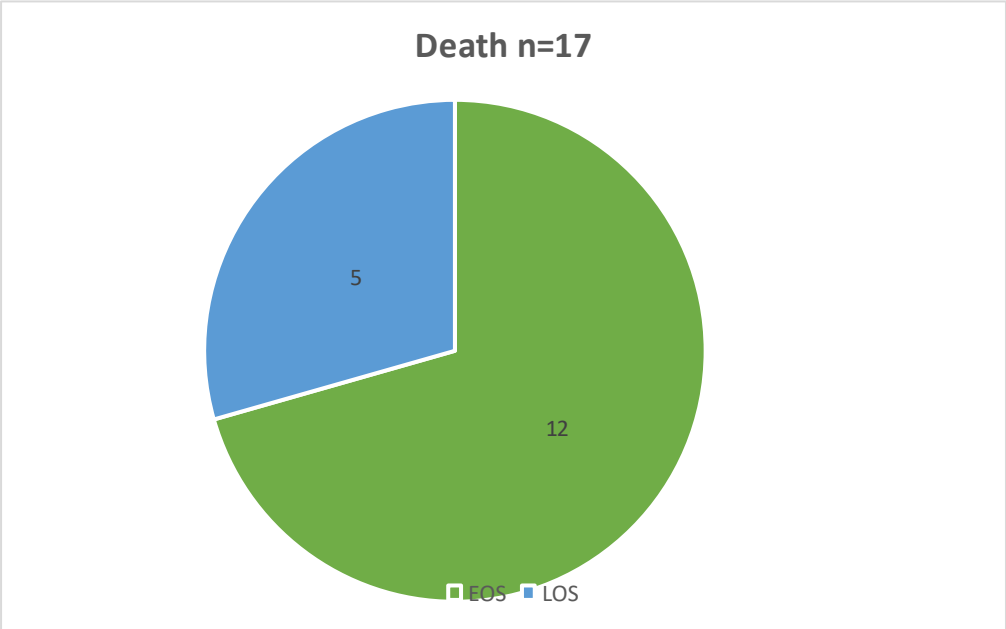

Fig 11: Distribution of death cases based on the type of sepsis

CONCLUSION

Neonatal sepsis is undoubtedly a significant cause of neonatal mortality regardless onset of sepsis, hence, all efforts should be taken toward controlling infection in the indisposed neonates.

The signs and symptoms of neonatal sepsis are very non-specific. So, in such conditions eliciting proper maternal history might help in identifying the high-risk neonates for special care and prematurity and LBW is important to risk factors making a neonate susceptible to sepsis.

Maternal risk factors associated with sepsis, that are found to be significant in our study are low socioeconomic status, meconium-stained cord, and frequent examination.

To improve the survival rate, the better approach suggested risk approach is early initiation of appropriate antibiotics and aggressive supportive care based on local sensitivity patterns and fatal risk factors.

Local microbiological databases like antibiograms should be prepared and the data obtained from antibiograms should be carefully updated regularly to provide information to clinicians on the effective management of sepsis.

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