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Clinico-Culture Study on Neonatal Sepsis

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Abstract **Original Research Article**

Background: Sepsis is a frequent and serious event which threatens survival during the neonatal period. The morbidity and mortality rate from neonatal sepsis continues to be high the world over inspite of the development of broad spectrum antibiotics and technological advances in life support therapy. ***Objectives:*** To find out the risk factors associated with neonatal sepsis and co-relate clinical sepsis with culture positive sepsis. ***Material and methods:*** Blood culture, sepsis screen, haematological & biochemical markers, cerebrospinal fluid (CSF) study, radiology are included in present study. ***Results:*** In present study One fifty (65.2%) were culture positive and 80 (32%) were culture negative out of 230 clinically suspected studied cases. Out of which 80 were culture negative cases in which 36(45%) neonates found that two or more sepsis screen tests positive, 42(52.5%) culture negative babies were found to be with risk factors and 2(2.5%) had evidence of pneumonia radio logically. ***Conclusion:*** blood culture is the gold standard of sepsis. Although it is time consuming, empirical antibiotics are administered during this period.
Keywords: Neonatal sepsis, blood culture, clinical sepsis, sepsis screen, t-bact, CRP.

INTRODUCTION

Neonatal sepsis is a socio-economic threat to every nation as it is the major cause of neonatal deaths globally. Incidence in India of neonatal sepsis is 2-10% [1]. Hence, early diagnosis and management of neonatal sepsis are essential to reduce the neonatal mortality [2]. According to National Neonatal Forum (NNF) of India, Probable (Clinical) Sepsis is based on presence of risk factors or sepsis screening positive or pneumonia finding on radiology. Sepsis with culture positive denotes isolation of pathogen from blood in a neonate who have clinical sign and symptom suggests of septicaemia [3]. Early diagnosis of neonatal sepsis is difficult to make as symptoms are overlapping and ill-defined [4]. Newer diagnostics test acute phase reactant; cell surface markers etc. but still blood culture forms the back bone. The purpose of the prospective study is to evaluate the results of different diagnostic tests in the presence of risk factors and/or clinical picture. We have included Blood culture, sepsis screen, biochemical markers, cerebrospinal fluid (CSF) study, and radiology in present study.

MATERIALS AND METHODS

This prospective study was carried out from July 2016 to September 2017 at Dr Vikhe Patil Medical College Ahmednagar, Maharashtra. Ethical clearance was obtained for the research project. One hundred and fifty neonates were enrolled for the study. Clinical history along with symptoms and signs were taken thoroughly. In blood culture 2 ml blood was collected aseptically before giving empirical antibiotics from every baby and same blood was inoculated into a McCartney bottle which contain10 ml of brain heart at37◦ c. growth of an organism was identified by the colony growth characteristics, Gram's stain and standard biochemical tests [6] was done. Eighty samples were put in BacT/ALERT-3D system (BioMerieux) surplus screen tests were done on blood samples of all the neonates who were studied. Radiological tests and CSF study were done where it was indicated and incubated aerobically at 37◦c for maximum 24 hr. It was then Subcultures on Blood agar and MacConkey's agar and incubated overnight. Perineal swabs of studied neonates were inoculated into mannitol salt semi-solid (MSA) agar and incubated at 37◦ C for maximum 24 hrs.

RESULTS

During this study period, 230 suspected neonates were admitted to the NICU. Most of the babies had more than one clinical finding. Maximum culture positive babies had hypothermia (92%) followed by Tachypnea (73.3%) and cyanosis (66.7%).

Table-1: Distribution of clinical findings of NICU cases

Clinical findings	Culture positive(n=150)	Culture negative(n=80)
Hypothermia	138	48
Hyperthermia	4	2
Tachycardia	94	70
Tachypnea	110	68
Chest Retractions	104	66
Cyanosis	100	10
Poor feeding/Refusal to feed	54	18
Lethargy	64	2
Convulsion	18	2
Abdominal distension	10	2
Vomiting	6	0
Diarrhoea	2	0

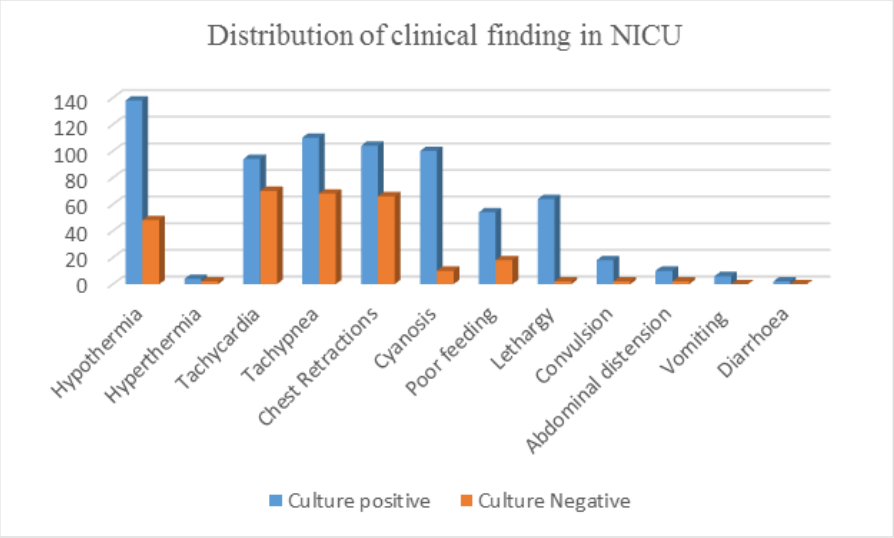

Fig-1

Table-2: Distribution of risk factor of neonates

Risk Factor	Culture Positive(n=150)	Culture Negative(n=80)
Low Birth Weight<2.5kg	126	32
Preterm	122	38
Birth Asphyxia	120	26
Meconium Aspiration	66	14
Maternal Illness	22	2
Premature Rupture of Membrane	48	10

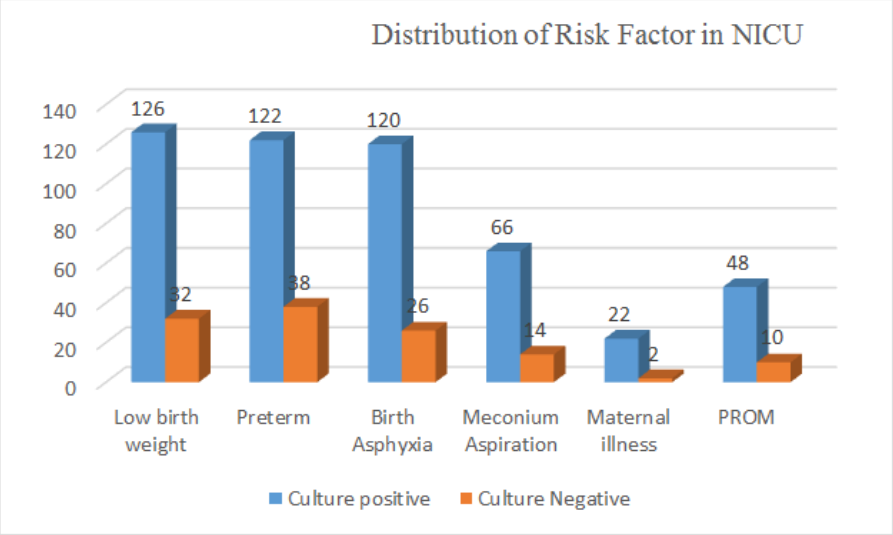

Fig-2

In our study low birth weight was the biggest risk factor followed by preterm and birth asphyxia.

Table-3: Sepsis Screening Parameter

Screening test	Culture Positive(n=150)	Culture Negative(n=80)
CRP	142	50
Increased TLC	130	48
Neutropenia	12	0
I/TN>0.2	126	10
Decreased Platelet	26	2
Two or more positive Test	146	32

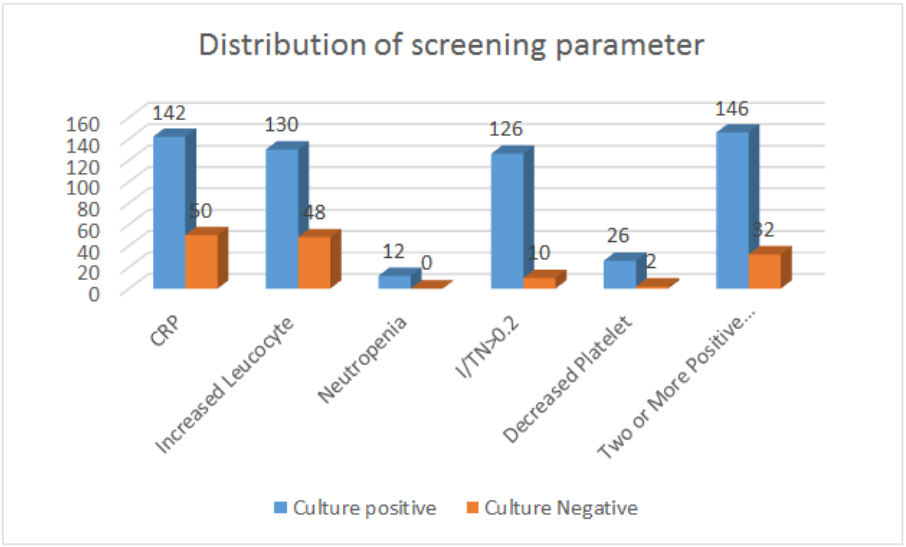

Fig-3

In present study maximum neonates with sepsis has high CRP followed by increased leucocyte count.

Table-4: Spectrum of clinical diagnosis of NICU cases

Clinical diagnosis	Culture positive(n=150)	Culture Negative(n=80)
Respiratory Distress Syndrome	110	46
Hypoxic Ischemic Encephalopathy	12	2
Necrotising Enter colitis	8	0
Umbilical sepsis	6	1
Meningitis	0	16
HIV	0	0

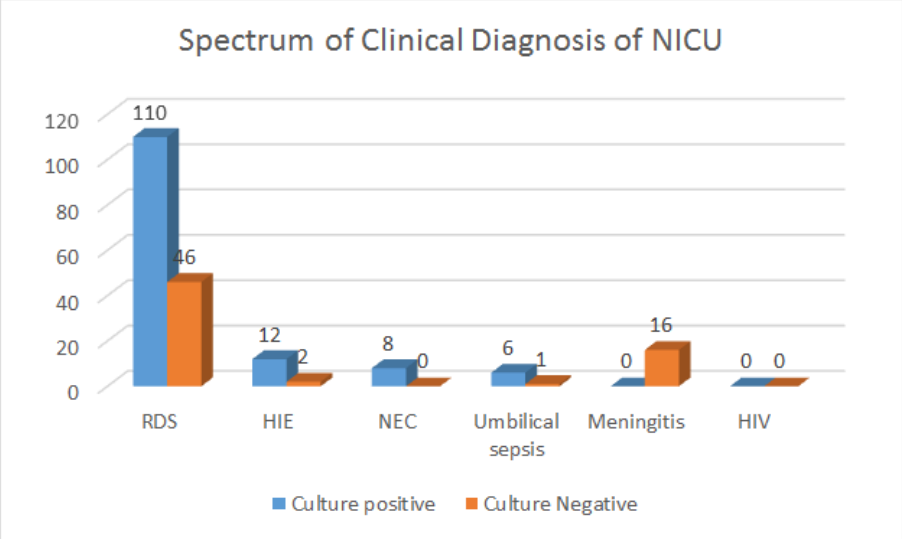

Fig-4

DISCUSSION

Neonatal septicaemia is a clinical diagnosis with features of sepsis with or without positive blood/CSF cultures during first month of life. So early diagnosis and treatment are crucial [7]. We have observed that blood culture positivity rate (65.2%) was quite higher in study because some samples were processed in BacT/ALERT-3D system. It's proved that Blood culture is still the "Gold standard" for the diagnosis of neonatal sepsis, but negative culture cannot exclude the sepsis [8]. Reason behind coming of culture negativity could be bacteraemia which is sometimes transitory or intermittent. Therefore collection and method of blood sampling is important. The chance of isolation can be improve by taking two or three sets of blood. This is mostly either due to the amount of blood inoculated into the blood culture bottle is not sufficient or not adequate so specimen cannot processed completely.

In Present study 156 babies were having respiratory distress and found to be the commonest symptom. We observed 178 babies have leucocytosis. There were no cases encountered with leukopenia. Absolute neutrophil count (ANC) though highly specific but has very low sensitive test present study.infact CRP and I/TN ratio has high sensitivity and low specificity in study. Therefore combining two or more sepsis screen tests has increased sensitivity and specificity.

The results of the present study were comparable with the study conducted by De A Set *et al*. [5], Sankar MJ *et al*. [7] ,Roy I *et al*. [11] and Shah AJ *et al*. [12] where clinical features of sepsis are non-specific in neonates and a high index of suspicious is required for the diagnosis on time. They also stated blood culture as the gold standard but it takes 48-72 hours. Therefore they said septic screen to be done till the report comes and proper antibiotics to be started accordingly.

The diagnosis of neonatal sepsis is a big challenge still. In an effort to improve the outcomes of infected infants, lot of researches is going on. The biggest challenge in the management of neonatal sepsis is the MDR organism. Though novel treatments is now available but still more research is needed to determine on how to prevent and diagnosis as early as possible.

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