HAEMATOLOGICAL PROFILE IN CLINICALLY SUSPECTED CASES OF NEONATAL SEPSIS

Abstract:

The present study was a two year observational study of haematological profile in clinically suspected cases of neonatal sepsis. Study analyze **(write in past tense analysed)** the haematological findings according to Rodwell's Haematological **(write in small letter h)** scoring system in neonates clinically suspicious of having sepsis. It included 108 neonates clinically suspicious to have sepsis and **(can be omitted)** admitted in NICU of our hospital during the study period of June 2015 to May 2017. According to clinical findings, Rodwell's hematological score and blood culture positivity 108 neonates were divided into three groups; proven sepsis, probable sepsis and no sepsis group neonate **(can be omitted)**. Study show that Rodwell's haematological scoring system is a simple, quick, cost effective tool which can be used as screening test for early diagnosis of neonatal sepsis.

Keywords: Neonatal sepsis, Haematological Scoring **(write in small letter s)**, Newborn, Septicemia, **(can be omitted)**, erythrocyte sedimentation **(write in capital letter E)**

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INTRODUCTION

Neonatal septicemia is one of the major factors contributing to the high perinatal and neonatal mortality and morbidity [1] in newborns **(can be omitted)** and is recognized as global health challenge. Neonate is defined as infant less than 1 month from the birth. Worldwide neonatal sepsis is the single most important cause of neonatal deaths and with risk of neurodevelopmental impairment seen in survivors. 99% **(write Ninety nine percent)** of them occur in developing countries like India [2]. Early, accurate and rapid diagnosis of neonatal sepsis remains a major diagnostic challenge in neonatology. The present study was undertaken to establish the usefulness of peripheral smear findings and Rodwell's hematological scoring system for early diagnosis of neonatal sepsis. The Rodwell's haematological scoring system (HSS) is simple, quick, cost effective and readily available tool for the early diagnosis of neonatal sepsis.

AIM (Not necessary)

To study the changes in hematological profile along with blood culture and C-reactive proteins in clinically suspected cases of neonatal sepsis.

OBJECTIVES

To analyze the haematological findings according to Rodwell's Haematological scoring system in neonates clinically suspicious of having sepsis. To correlate these haematological parameters with other tests like blood culture and C-reactive proteins.

OBJECTIVES (Modified):

Primary objectives: To observe the changes in haematological profile according to Rodwell's haematological scoring system in neonates clinically suspicious of having sepsis. Secondary objectives: To correlate these haematological parameters with other tests like blood culture and C-reactive protein (CRP).

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REVIEW OF LITERATURE (Not necessary)

Neonatal septicemia is one of the major cause contributing to the high perinatal, neonatal morbidity and mortality. Several authors have reported that the mortality due to neonatal sepsis ranges between 40-65% [3]. Neonatal sepsis is defined as a clinical syndrome of bacteremia with systemic signs and symptoms of infection in the first 4 weeks of life [4]. Systemic bacterial disease occurs in neonates depending on factors such as prematurity, predisposing maternal conditions and the extent of life support procedures required prenatally. The clinical diagnosis of neonatal septicemia is difficult in many situations, as it presents with non specific symptoms and signs. The pattern of organisms causing neonatal septicemia is constantly changing [5]. Neonatal sepsis can be classified into two sub-types depending upon whether the onset of symptoms is before 72 hours of life (early onset) or later (late onset). Of newborns with early onset sepsis, 85% present within 24 hours, 5 % present at 24-48 hours and a smaller percentage present within 48-72 hours. Onset is most rapid in premature neonates [6].

Pneumonia is more common in early onset sepsis, whereas meningitis and bacteremia are more common in late onset sepsis. Premature and ill neonates are more susceptible to sepsis and show subtle nonspecific initial presentation. Considerable vigilance is therefore required in these patients so that sepsis can be effectively identified and treated. The associated factors for late onset sepsis include low birth weight, early gestational age, mechanical ventilation,

total parenteral nutrition and its duration, previous antimicrobial exposure, lack of breastfeeding, superficial infections (pyoderma, umbilical sepsis),aspiration of feeds, disruption of skin integrity with needle pricks and use of intravenous fluids or central venous catheter [7]. Several bacterial species are particularly associated with neonatal sepsis. Gram positive organisms are mainly responsible for early onset of infection [8]. Since the early 1970s, when group B Streptococcus emerged as a major cause of neonatal sepsis and meningitis, group B Streptococcus and Escherichia coli have accounted for approximately 60-80% of cases of early onset neonatal sepsis [9]. The neonatal period is crucial for intestinal colonization, and the processes involved in the establishment of microbial populations are complex and involve both microbial succession as well as interactions between the infant and the microbes in the different regions of the gut [10]. Mode of delivery is a key factor that shapes the developing infant microbiota. Vaginally born infants are initially colonized by fecal and vaginal bacteria from the mother, whereas infants born via caesarean section are exposed initially to bacteria originating from the hospital enviorment and health-care workers [11]. Recent studies have demonstrated the low incidence of meningitis in neonates undergoing routine evaluation for sepsis in the first 72 hours of life who have no specific signs of infection and some perinatologists have suggested that a lumbar puncture is unnecessary in this situation. A small number of cases of meningitis will be missed. Evaluation and interpretation of CSF should be a routine part of the evaluation of a neonate for possible sepsis. Acute phase reactants are serum proteins produced primarily in the liver but also in the intestine in response to various stimuli. The various acute phase reactants are ceruloplasmin, fibrinogen, C-reactive proteins (CRP), and orosomucoid [12]. A major function of C reactive protein, a component of innate immune system is its ability to bind phosphocholine and thus recognize some foreign pathogens as well as phospholipid constituents of damaged cells [13]. Many authors have used CRP levels along with various hematological parameters like WBC count, I: T ratio, polymorphonuclear count and band counts to achieve high sensitivity and specificity [14].

The most widely used indicators of the response of acute phase proteins are the erythrocyte sedimentation rate and plasma C-reactive protein concentration. As a test, the erythrocyte sedimentation rate has the advantages of familiarity, simplicity and an abundant literature compiled over the past seven decades. Nonetheless, measurement of C-reactive protein has several advantages over ESR measurement. The erythrocyte sedimentation rate is an indirect measurement of plasma acute phase protein concentration and can be greatly influenced by the size, shape and number of erythrocytes, as well by other plasma constituents such as

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immunoglobins. Consequently the results are imprecise and sometimes misleading. Although the erythrocyte sedimentation rate represented a great advance when it was introduced in the 1920s, this indirect method is no longer needed to asses plasma concentrations of fibrinogen, because they can now be determined directly.

MATERIALS AND METHODS

The present study was a two year observational study, carried out in the department of Pathology of tertiary care hospital. Our study includes **(write in past tense included)** study of **(omit)** neonates having clinical suspicion of sepsis admitted in NICU **(any abbreviation for the first time write in full form)** during the period from June 2015 to May 2017. All suspected cases of neonatal sepsis admitted in NICU of a tertiary care hospital during the study period were included in the study.

The study was conducted over period of 24 months from June 2015 to May 2017. **(can be omitted)**. 2 **(write Two)** ml blood samples **(write sample)** from neonates suspicious to have sepsis were collected in EDTA **(any abbreviation for the first time write in full form)** vacutainer from peripheral venipuncture using aseptic precautions. In Pathology Department **(write in small letter d),** the blood samples were processed within half an hour. The blood samples were analyzed for routine hematological parameters viz hemoglobin, haematocrit, red blood cell indices (MCV, MCH and MCHC), total WBC count, differential count and platelet count. These investigations were performed on **(write with)** Automated Haematology analyzer **(write in capital letter A)** Sysmex– XT 1800-i. For every sample a peripheral smear was made and blood film was stained with Leishman's stain.

OBSERVATION AND RESULTS

The present study was a two year observational study, carried out in the department of Pathology in tertiary care center. It includes study of blood samples of 108 neonates who clinically presented with symptoms of sepsis were admitted in NICU during the period from June 2015 to May 2017.

Table 1: Age wise distribution of cases of clinically suspected neonatal sepsis

Age	No. of cases	Percentage %
< 2 days	80	74%
3-7 days	16	14.8%
7-30 days	12	11.2%
Total	108	100%

As shown in table no. 1, the age of the neonates in the present study ranged from newborn to

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a 26 day old neonate. 74% **(write seventy four percent)** neonates in the study were less than 2 days old. The mean age of the neonate was 3.41+2.15 days.

Table 2: Sex wise distribution of cases of clinically suspected neonatal sepsis

Sex	No. of cases	Percentage %
Male	70	64.82%
Female	38	35.18%
Total	108	100%

As shown in table no. 2, out of 108 cases studied 70(64.82%) were males and 38(35.18%) were females. Male : female ratio was (1.8) : (1)

Onset of symptoms (can be omitted)

Neonatal sepsis was divided into 2 groups according to the onset of symptoms. 1) Early onset sepsis- usually presents within the first 72 hours of life. And 2) Late onset sepsis-usually presents after 72 hours.

Table 3: Distribution of cases according to types of sepsis

Type of sepsis	No. of neonates	Percentage %
Early onset	80	74%
Late onset	28	26%
Total	108	100%

As shown in table no. 3, out of 108 cases studied 80(74%) neonates show **(write had instead of show)** early onset sepsis and 28 (26%) neonates showing **(can be omitted)** late onset sepsis.

DISCUSSION

Neonatal sepsis is a clinical syndrome characterized by signs and symptoms of infection with or without accompanying bacteremia in the first month of life. Sepsis is the commonest cause of neonatal mortality and is probably responsible for 30-50% of total neonatal deaths each year in developing countries. One of the most difficult tasks faced by the neonatologist is to clinically differentiate between septicemic and non septicemic cases. This is because several conditions like birth asphyxia, hypoglycemia, hypothermia, prematurity and intracranial hemorrhage have clinical features similar to septicemia. The gold standard for the diagnosis of neonatal sepsis is a positive blood culture. However procedure is time consuming require minimum period of 48-72 hours and yields a positive result in 8-73% of cases only and the facilities for the test might not be available in many laboratories. Hence there is need for an infallible test for bacteremia that is easily performed, quick, simple and cost effective with

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maximum sensitivity and specificity. In recent years, various investigations have evaluated some inflammatory markers (e.g. procalcitonin, haptoglobins, interleukins etc) to diagnose neonatal sepsis. Various cost effective but reliable laboratory test have evaluated for the diagnosis of systemic infection in neonates. The complete blood count with various neutrophils parameters and C-reactive protein are the most frequently used. The present study was undertaken to evaluate the haematological profiles of neonatal septicemia and to look into various haematological parameters both individually and in combination as part of sepsis screening. Serum C-reactive protein levels were also evaluated as a diagnostic test.

CONCLUSIONS

A two year observational study was performed to study the haematological profile in clinically suspected cases of neonatal sepsis. Clinical presentation of neonatal sepsis is nonspecific and can mimic many other conditions. Due to high mortality associated with neonatal sepsis, early diagnosis and prompt treatment are essential. In the present study neonatal sepsis was found to be associated with prematurity, meconium aspiration and with maternal risk factors viz premature rupture of membrane and prolonged labour. The gold standard' for the diagnosis of neonatal sepsis is a positive blood culture. However procedure is time consuming, require minimum period of 48-72 hours and yields a positive result in 8-73% of cases only. The facilities for the test might not be available in all laboratories. Rodwell's haematological scoring system with cut off score of >3 diagnosed 23 out of 24 culture positive cases and yielded 96% sensitivity, 82% specificity, 38% positive predictive value and 90% negative predictive value. **(not relevant)**. Results from this study show that Rodwell's haematological scoring system is a simple ,quick, cost effective tool which can be used as screening test for early diagnosis of neonatal sepsis. This study emphasizes the importance of correlation of clinical information with laboratory findings.

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