

# CLINICAL FEATURES ASSOCIATED WITH NEONATAL SEPSIS IN JOS, NORTH CENTRAL, NIGERIA

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## ABSTRACT:

**Background:** Neonatal sepsis remains a major cause of morbidity and mortality in Africa. The objectives of this study were to determine the predominant clinical features associated with neonatal sepsis in this environment.

**Methodology:** The study was a cross-sectional study conducted in a tertiary care hospital in Jos, North Central, Nigeria. Clinical and demographic data were collected from care givers of the 218 neonates suspected to have sepsis. Biological samples were also collected from the neonates and processed by standard methods in the microbiology laboratory of the hospital. All the data obtained were analyzed using Epi info version 3.5.3 statistical software.

**Results:** Of the 218 neonates (109 males, 99 females), 99 (45.5%) had a birth weight of less than 2500 grams. The common clinical features the neonates presented with were respiratory distress (45%), fever (35.3%), refusal or inability to suck (34.4%), jaundice (28.4%); excessive cry or irritability (24.3%), body rashes/skin pustules (23.4%), lethargy (17.4%) hypothermia (16.1%) and umbilical pus discharge (12.8%). However, in the statistical analysis of the common clinical features and culture results, presence of fever, poor sucking, body rashes/skin pustules or umbilical pus discharge had P values < 0.05.

**Conclusion:** This study suggests that presence of fever, poor sucking, body rashes or skin pustules, respiratory distress and umbilical pus discharge were strong predictors of bacterial sepsis in the neonate. Prompt therapy and early referral of neonates with these features will go a long way in reducing mortality attributed to neonatal sepsis in our environment.

**Key words:** Clinical features, neonatal sepsis, North Central, Jos, Nigeria

## INTRODUCTION

Neonatal sepsis is a systemic infection occurring in the first twenty eight (28) days of life of a newborn.<sup>1</sup> Neonatal sepsis is very prevalent in sub-Saharan Africa and contributes up to 69% to neonatal mortality in Nigeria and other parts of Africa.<sup>2,15</sup> It occurs in 0.5 to 8.0 per 1000 live births.<sup>7-10</sup> Gestational age at delivery has also influenced the extent of morbidity and fatality in neonatal sepsis.<sup>12-14</sup> In preterm infants, neonatal sepsis contributes to significant neurological damage in the neonate, undermines the quality of life of the neonate, traumatizes mothers and care givers with eventual loss of productive hours.<sup>11,16</sup>

In everyday clinical practice, there exists a challenge in deciding which neonates are at high risk for sepsis considering the numerous maternal, antenatal, peripartum and perinatal challenges in our environment. A sepsis screen using cultures of blood and body fluids is the main diagnostic test that distinguishes septic from non-septic neonates as the clinical features of neonatal sepsis are widely nonspecific and mimic a number of other clinical conditions in a sick neonate.<sup>17</sup> These facilities may not be readily available in all centres. However, certain clinical presentations of the neonates may be a significant indicator of sepsis in the neonate.

Determination of the common clinical features of neonatal sepsis will ensure early diagnosis and treatment or referral to appropriate centers. This will help to reduce morbidity and mortality especially in resource poor centres where confirmation of diagnosis may take time and such facilities may not be readily available.

This study therefore aims to identify the common clinical features of neonatal sepsis in Jos, Nigeria. Furthermore, it sought to determine the relationship between these features and culture results. There are few of such studies in Nigeria and particularly in Jos, North Central, Nigeria.

## METHODS

This study was a cross sectional study carried out between June and December of 2011.

**Study area:** The study was carried out in the Special Care Baby Unit (SCBU) of Jos University Teaching Hospital (JUTH), Jos, Plateau State. JUTH is a 600 bed capacity tertiary health care institution which serves as a referral center for most states in North central, Nigeria. The SCBU is a 30 bed capacity unit where neonates in need of intensive and special care are managed.

**Ethical consideration:** Ethical clearance for the study was obtained from the JUTH research and ethics committee. Recruitment of neonates and participation in the study was subject to voluntary informed consent by parents or caregivers of the neonates after detailed explanation of the study to them.

**Recruitment of participants and data collection:** The WHO young infant study group criteria and the Integrated Management of Childhood Illnesses (IMCI) criteria were used to select subjects for the study.<sup>17</sup> A clinical diagnosis of neonatal sepsis was made if a neonate presented with at least one of the signs in the tool. All neonates that met the criteria were recruited consecutively. After detailed history taking and physical examination, the clinical features present in the neonate were recorded in the study data form.

**Sample Collection:** Samples collected include blood, cerebrospinal fluid (CSF) and urine. Standard aseptic techniques were observed in both collection and processing of samples. Blood for culture was obtained by venipuncture of any two peripheral veins after adequate aseptic preparations. They were inoculated immediately at the site of collection into brain heart infusion broth at a ratio of 1:10 (Blood: Broth). CSF samples were collected by lumbar puncture between the 4<sup>th</sup> and 5<sup>th</sup>

spinal arachnoid space after adequate aseptic preparation. Urine samples were obtained by suprapubic aspiration after ensuring that the neonate had not voided in the preceding 30 minutes to one hour. The CSF and urine samples were collected in sterile universal bottles and transported to the microbiology laboratory immediately.

**Laboratory methods:** Specimens collected from the neonates were processed by standard methods.<sup>18</sup> The samples were inoculated on Blood agar, chocolate agar (Oxoid, Basingstoke, UK) and MacConkey agar (Flukamedica) plates using a sterile platinum wire loop. MacConkey and blood agar plates were incubated aerobically at a temperature of 35-37°C for 24-48 hours, while chocolate agar plates were incubated in a candle extinction jar (to provide 5% CO<sub>2</sub>) to facilitate growth of fastidious organisms. Isolates were identified by microscopy, culture and biochemical techniques and documented.<sup>18,19</sup>

**Statistical analysis:** EPI Info version 3.5.3 statistical package was used for statistical analysis. Chi square analysis and odds ratio were used to relate the clinical features with positive culture results of biological samples collected from the neonates. P value was set at 0.05.

## RESULTS

There were a total of 218 neonates admitted with neonatal sepsis. These consisted of 119 (54.6%) males and 99 (45.4%) females. One hundred and seven (49.1%) were less than or equal to three days of age while 111 (50.9%) were above three days of age. Ninety nine (45.5%) of the neonates had a birth weight less than 2,500 grams. Sixty three (28.9%) of the neonates were delivered before the 37<sup>th</sup> week of gestation (Pre-term). Seventy five neonates (34.4%) had positive cultures, these comprised of forty (33.6%) males and 35 (35.4%) females.

The commonest clinical features the neonates presented with were respiratory distress (45%), fever 35.3% and refusal or inability to suck (34.4%). Others were as stated in Table 1. The least common clinical features were cough (4.6%), vomiting (4.6%), diarrhea (4.6%), eye discharge (3.7%), abdominal distension (2.3 %) and generalized edema (2.3%). The statistical relationship of these common clinical features and the outcome of the culture results were as documented in table 1.

However, in the statistical analysis of the common clinical features and culture results, presence of fever, poor sucking, body rashes/skin pustules or umbilical pus discharge had P values  $\leq$  0.05.

**Table 1: Relationship of common clinical features and culture confirmed sepsis in the neonates studied in Jos University Teaching Hospital**

Clinical Features	Present Freq (%)	Culture		Multivariable analysis		
		Positive Freq (%)	Negative Freq (%)	Odds Ratio	95% C.I	P-value
<b>Respiratory distress</b>						
Yes	98 (45.0)	37 (37.8)	61 (62.2)	1.31	0.75-2.29	0.347
No	120 (55.0)	38 (31.7)	82 (68.3)			
<b>Fever</b>						
Yes	77 (35.3)	47 (61.0)	30 (39.0)	6.32	3.42-11.68	0.000
No	141 (64.7)	28 (19.9)	113 (80.1)			
<b>Poor sucking</b>						
Yes	75 (34.4)	46 (61.3)	29 (38.7)	6.24	3.37-11.51	0.000
No	143 (65.6)	29 (20.2)	114 (79.7)			
<b>Jaundice</b>						
Yes	62 (28.4)	22 (35.5)	40 (64.5)	1.07	0.58-1.97	0.832
No	156 (71.6)	53 (34.0)	103 (66.0)			
<b>Irritability</b>						
Yes	53 (24.3)	20 (37.7)	33 (62.3)	1.21	0.64-2.29	0.557
No	165 (75.7)	55 (33.3)	110 (66.7)			
<b>Body rashes/Skin pustules</b>						
Yes	51 (23.4)	35 (68.6)	16 (31.4)	6.95	3.50-13.77	0.000
No	167 (76.6)	40 (24.0)	127 (76.0)			
<b>Lethargy</b>						
Yes	38 (17.4)	14 (36.8)	24 (63.2)	1.14	0.55-2.41	0.728
No	180 (82.6)	61 (33.9)	119 (66.1)			
<b>Hypothermia</b>						
Yes	35 (16.1)	14 (40.0)	21 (60.0)	1.33	0.64-2.78	0.447
No	183 (83.9)	61 (33.3)	122 (66.7)			
<b>Umbilical pus discharge</b>						
Yes	28 (12.8)	17 (60.7)	11 (39.3)	3.52	1.59-7.87	0.002
No	190 (87.2)	58 (30.5)	132 (69.5)			

C.I - Confidence Interval

**DISCUSSIONS**

Respiratory distress was the most common feature in the neonates admitted with a clinical suspicion of neonatal sepsis in this study. Although this was not statistically associated with positive culture, these neonates may have sepsis caused by some fastidious organisms which may have been difficult to culture using routine techniques. Moreover, respiratory distress may complicate cardiovascular collapse or metabolic derangements such as acidosis, and hypoglycemia, or may even suggest pneumonia.<sup>26, 27</sup> Pneumonia if found in a sick neonate is both a major precursor and a known complication of sepsis.<sup>4</sup> In a study carried out in India, researchers found that 68% of the neonates who had sepsis also had respiratory distress and pneumonia.<sup>22</sup> Similarly, 74.7% of neonates diagnosed of sepsis in a Jordanian study had respiratory distress.<sup>21</sup> The highest mortality was also amongst these group of neonates in the Indian study.<sup>22</sup> Therefore, neonates with respiratory distress should have a sepsis screen and are candidates for empirical antibiotic therapy.

However, we found that such features such as fever, inability to suck, body rashes or skin pustules

and umbilical pus discharge were significantly associated with culture positive sepsis in the neonates studied in Jos, Nigeria. This is similar to the findings in several other studies in Asia and Africa where fever, poor sucking, skin pustules and umbilical pus discharge were common denominators for sepsis that was confirmed by culture.<sup>24-29</sup> In a study carried out in Tanzania<sup>18</sup>, sepsis was significantly higher in neonates with fever and hypothermia ( $p=0.02$ ), skin pustules ( $p<0.001$ ), umbilical pus discharge and abdominal wall hyperemia ( $p=0.04$ ) which were similar to the findings in this study where  $P<0.001$  was found for presence of fever, skin rashes or pustules and poor sucking in relation to culture confirmed sepsis. Presence of skin pustules was an independent predictor of sepsis in the Tanzania study.<sup>28</sup> In addition, skin pustules and umbilical pus discharge may be heralded by poor hygiene especially amongst the low socioeconomic group. The impact of socioeconomic factors on neonatal sepsis have been studied previously.

Furthermore, poor sucking or feeding predisposes such neonates to hypoglycaemia which has been identified as an important predictor of neonatal mortality as documented in some Nigerian and

Ugandan studies.<sup>16</sup> The hypoglycemic effect is further worsened by the increased catabolism experienced during febrile episodes. Eventually, we may be able to increase the chances of survival of these neonates with more focused clinical monitoring, prompt therapy and early referral.

## CONCLUSION

The most common clinical feature in neonates admitted with neonatal sepsis was the presence of respiratory distress. This was followed by fever and poor sucking which were in addition associated with positive culture results. Furthermore, the presence of body rashes or skin pustules and umbilical pus discharge; although less common features, were significantly associated with positive cultures. Neonates with these clinical features should therefore be identified and managed promptly or referred to appropriate centers. This will help to reduce mortality from neonatal sepsis in our environment.

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