Summary

Sepsis is a serious disease with high mortality rate in newborn particularly, in preterm, and in very-low-birth weight infants (Vergnano et al, 2005). A fast and correct diagnosis followed by rapid treatment, play an important role in reduction of infant mortality resulting from sepsis.

Blood cultures are the current “gold standard” of blood steam infection (BSI) diagnosis. However, the limitation of the gold standard in the diagnosis of neonatal sepsis is not only in the delay of cultures reports, after (48-72) hours but also, in the frequently false negative results (Sarkar et al, 2006).

Molecular assays for the detection of bacterial DNA in the blood represent possible new diagnostic tool for the early identification of a bacterial cause (Cotton et al, 2009).

In our attempt to evaluate the role of molecular techniques in the diagnosis of neonatal sepsis, we collected (62) blood samples from (62) neonates, who were diagnosed with neonatal sepsis, to perform blood culture and PCR targeting the 16S rRNA, followed by sequencing for PCR positive cases. We classified our patients into; proven sepsis (group one) included (22) cases and non-proven sepsis (group two) included (40) cases.

The proven sepsis group(22patients) included (10) cases with positive B.C and PCR result , (6) cases with positive B.C and negative PCR and( 6) cases with positive PCR but negative B.C result.
The patients' mean birth weight was (2690+/−834.10g) with mean gestational age of (36.03+/−2.787 weeks).

Prolonged capillary refill time> (3 sec), feeding intolerance and presence of lethargy were the only clinical signs with statistically significant different and the result was higher among proven sepsis group than non-proven sepsis group.

In our study WBCs abnormality, thrombocytopenia, I/T ratio ≥0.2, positive CRP, highest CRP and positive septic screen, significaly correlated between the two groups and was higher in proven sepsis group than non-proven sepsis group.

The most predominant provisional diagnosis among total cases in our study was sepsis followed by RDS then pneumonia.

From the total (62) cases included in this study, at discharge from the NICU, (25) patients were diagnosed with sepsis, including both bacterial proven and non-proven sepsis and (37) infants were discharged with a diagnosis of other non-infectious diseases.

Blood culture was positive in (16) cases (26%) and negative in (46) cases (74%) of the diagnosed neonatal sepsis cases, from these (16) cases, (8) cases only were diagnosed with sepsis from total (25) cases diagnosed with sepsis in this study, that was counting for 32% (8/25).

Also PCR was positive in (16) cases (26%) and negative in 46 cases (74%), however, from these (16) cases, (11) patients were diagnosed with sepsis from total (25) cases diagnosed with sepsis in this study, therefore (44%) (11/25) of patients were diagnosed with sepsis in the positive PCR cases. In spite of, the equal results of PCR and blood
culture in this study, the detection of bacteremia by blood culture was (32%) while by using a molecular method, namely broad range 16S rRNA PCR the rate was improved to (44%)

In the present study, we had (12) patients with discrepant B.C and PCR results, (6) of them had positive blood culture and negative PCR results. From these (6) cases, (4) cases were considered culture contamination, as the isolate identified in these cases was CONS. And (6) cases showed no growth by culture but had positive PCR sequencer analysis. Five of these cases ended with the diagnosis of sepsis based on their clinical and laboratory parameters and all of these six cases revealed a pathogen known to cause neonatal sepsis.

In our study the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of septic screen compared to B.C in the diagnosis of neonatal sepsis was, (62.5%,63%,37% and 82.8%) respectively and it showed higher NPV that help to rule out bacteremia but lower sensitivity than PCR. Septic screen beside other clinical details helps in better categorizing the cases in which the PCR and blood culture were discrepant (Khalada et al, 2010).

Evaluation of conventional PCR against blood culture, regarded as the gold standard showed (86.05%) sensitivity, (62.5%) specificity, (86.05%) PPV and (62.5%) NPV. While, the accuracy of this test was (79.66%). In comparison to blood culture, the 16SrRNA PCR demonstrated a high negative predictive value that could help us in ruling out neonatal sepsis and stop unnecessary antibiotics (Jordan and Dueso, 2005).
Standard identification methods have higher cost per test (500 L.E.) compared to PCR followed by sequencing (280 L.E.), and longer turnaround time (7-15 days) compared to PCR followed by sequencing (10 hours).

The cost-effectiveness of PCR sequencer analysis must take in consideration when compared to the costs of possible mortality or morbidity due to inaccurate identification of an isolate, incorrect clinical diagnosis, or excessive use of antibiotics.

Finally we conducted that PCR has potential as a method for earlier detection of bacteria but this technology needs to be further developed and improved. DNA amplification techniques lack the determination of antibacterial susceptibilities, which must still be determined by conventional methods necessitating organism growth. Blood culture still has to go hand in hand with molecular method at present, since pure isolates are essential for antimicrobial drug susceptibility testing. The cost-effectiveness of PCR sequencer analysis must take in consideration cases with high clinical suspicion of neonatal sepsis despite negative blood culture.