IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 12 Ver. X (Dec. 2017), PP 46-48
www.iosrjournals.org

A Cross Sectional Study to Assess the Blood Stream Infection Amongst the Neonates, Infants And Children in A Tertiary Care Set Up of Eastern India

Dr. Sanjeev Das[1],Dr. Jayashree Konar[2], Mr. Asim Kumar Pahari[3]
[1]*Assistant Professor (Microbiology), R G Kar MCH, Kolkata*
[2]*Demonstrator (Microbiology), N R S MCH, Kolkata*
[3]*Laboratory Technician*
Corresponding Author: Dr. Jayashree Konar

Abstract: *Blood culture remains the mainstay of laboratory diagnosis of bloodstream infections in infants and children and neonatal septicaemia. The cross sectional study was performed with 96 cases over a period of three months from 15th October to 14th December, 2017 in a tertiary care set up. Aerobic and anaerobic blood culture for clinically suspected cases was performed by automation (BACTEC). Blood volume and number samples were decided as per standard protocols. Blood culture bottles with positive growth indicated by automation were subcultures on Mac conkey's agar media, blood agar media and chocolate agar media. Antibiotic susceptibility testing was done as per standard microbiological guidelines by Kirby Bauer's technique. A total of 96 blood culture (88 aerobic and 8 anaerobic) was performed out of which, in 25 cases, bacterial growth was obtained (26.04%). Out of these 25 cases, in one case, anaerobic culture indicated presence of bacterial growth. Amongst 24 aerobic growth, 13 cases were due to Staphylococcus aureus, 5 cases were due to Salmonella Typhi, 3 was Escherichia coli, Klebsiella pneumoniae was isolated in 2cases and in one case, blood stream infection was caused by Staphylococcus haemolyticus. Streptococcus pneumonia was isolated in the case where blood culture showed growth in anaerobic condition. Escherichia coli was found to be the major Gram negative pathogen to cause neonatal septicaemia (28%). Isolated Streptococcus pneumoniae was sensitive to Penicillin, Ampicillin, Amoxycillin- Clavulanic acid, Erythromycin, all four generations of Cephalosporins, Vancomycin, Linezolid and Teicoplanin. 18 of the isolated 24 aerobic bacteria were resistant to fluoroquinolones (75%).*

Keywords: *blood culture, automation*

Date of Submission: 15 -12-2017 Date of acceptance: 22-12-2017

I. Introduction

Blood culture remains the mainstay of laboratory diagnosis of bloodstream infections in infants and children and neonatal septicaemia. It is essential for not only identification of the causative agent but also for susceptibility testing on the organism to optimize antimicrobial therapy and duration. A negative blood culture is just as important, as it rules out cases of bacterial involvement and prompts continued investigation of other infectious or noninfectious etiologies and cessation of unnecessary empirical antimicrobial therapy [1]. The spectrum of pathogens causing pediatric blood stream varies widely by age, symptoms, and immune status. In 1979, an evaluation of pediatric blood culture found *Haemophilus influenzae* to be the most prevalent organism followed by *Streptococcus pneumoniae* and *Staphylococcus aureus* [2]. Now a day, *H. influenzae* and *S. pneumoniae* are rare bloodstream pathogens. A 2012 study of infants of <3 months of age found the leading causes of bacteremia to be *Escherichia coli*, group B *Streptococcus* (*Streptococcus agalactiae*), and *S. Aureus*[3]. The rate of neonatal septicaemia in otherwise healthy children drops precipitously after the first few months of life, but if occurring, the most common pathogens are *S. aureus, S. pneumoniae* due to community-acquired pneumonia, and *Neisseria meningitidis* in adolescents [1]. Immunocompromised children are susceptible *Pseudomonas aeruginosa* and *Candida* spp. In addition to above mentioned pathogens [4].
Keeping these facts in mind, the present study was piloted with an aim to assess the pathogens responsible for blood stream infection of the infants and children.

II. Methodology

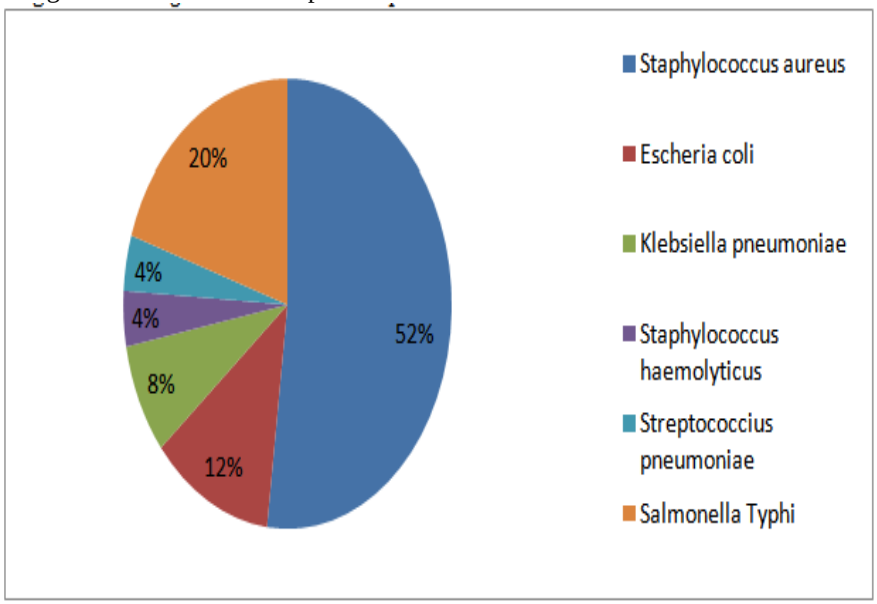
The cross sectional study was performed with 96 cases over a period of three months from 15th October to 14th December, 2017 in a tertiary care set up. Aerobic and anaerobic blood culture for clinically suspected cases was performed by automation (BACTEC). Blood volume and number samples were decided as per

standard protocols [1, 5]. Blood culture bottles with positive growth indicated by automation were subcultures on Mac conkey's agar media, blood agar media and chocolate agar media. Antibiotic susceptibility testing was done as per standard microbiological guidelines(Clinical Laboratory Standard Institute i.e, CLSI M100S) by Kirby Bauer's technique [1].

Results

A total of 96 blood culture (88 aerobic and 8 anaerobic) was performed out of which, in 25 cases, bacterial growth was obtained (26.04%). Out of these 25 cases, in one case, anaerobic culture indicated presence of bacterial growth. Amongst 24 aerobic growth, 13 cases were due to *Staphylococcus aureus*, 5 cases were due to Salmonella Typhi, 3 was *Escherichia coli*, *Klebsiella pneumoniae* was isolated in 2cases and in one case, blood stream infection was caused by *Staphylococcus haemolyticus*. *Streptococcus pneumonia* was isolated in the case where blood culture showed growth in anaerobic condition. *Escherichia coli* was found to be the major Gram negative pathogen to cause neonatal septicaemia (28%).

Figure-1: Pie diagram shows Bacteria responsible for blood stream infection in case of infants and children:



Amongst the isolated *Staphylococcus aureus*, 6 were Metthicillin Resistant (46%) and all were sensitive to vancomycin linezolid and teicoplanin. Amongst the isolated Salmonella Typhi, 2 isolates were resistant to fluoroquinilones. All the Gram negative isolates were sensitive to Carbapenems and Polymyxinantimicrobials. 66 % and 50% of the isolated Escherichia coli and Klebsiella pneumonia were Extended Spectrum Beta Lactamase producers respectively. No Amp C beta Lactamase producer was found. Isolated *Streptococcus pneumoniae* was sensitive to Penicillin, Ampicillin, Amoxycillin- Clavulanic acid, Erythromycin, all four generations of Cephalosporins, Vancomycin, Linezolid and Teicoplanin. 18 of the isolated 24 aerobic bacteria were resistant to fluoroquinolones (75%).

III. Discussion

In the past few years, the development of a number of rapid diagnostic methodologies has revolutionized the approach to diagnosing blood stream infection in all patient populations. There are many available assays for *in vitro* diagnostic use on positive blood cultures including peptide nucleic acid fluorescent *in situ* hybridization, Film Array blood culture identification panel, Verigene Gram-positive blood culture and Gram-negative blood culture panel and Matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) [1]. A recent review by Kothari et al. provides a thorough summary of the most recent technologies for diagnosis of blood stream infection [6]. A study conducted by Pradhan et al., suggests that 15% fever cases were due to bacterial aetiopathology and Salmonella infections are the leading cause of bloodstream infection among paediatric outpatients with fever in Kathmandu Valley [7]. Similarly, in our study, *Staphylococcus aureus* was the commonest causative agent (52%) followed by Salmonella Typhi (20%). *Escherichia coli* was found to be the major Gram negative pathogen to cause neonatal septicaemia (28%). Different studies report that MRSA shows resistant to many of the drugs and sensitive only to Vancomycin, Linezolid antibiotics [8]. In this present study also, all the MRSA are sensitive to vancomycin and linezolid. Mohsen et al has reported that multidrug resistance was detected in 92 (38%) cultures, mainly among

gram negative isolates (78/92) [9]. In that study it was also reported that Gram positive isolates were less resistant to aminoglycosides, quinolones, clindamycin, and rifampicin and least resistant to vancomycin. In our study, we have found that 18 of the isolated 24 aerobic bacteria were resistant to fluoroquinolones (75%).

IV. Conclusion

Neonatal and paediatric blood culture and antimicrobial susceptibility testing should be in the must do list in a health acre set up to differentiate between the infectious or noninfectious etiologies and cessation of unnecessary empirical antimicrobial therapy.

References

[1]. Dien Bard J, McElvania TeKippe E. 2016. Diagnosis of bloodstream infections in children. J Clin Microbiol 54:1418–1424.
[2]. Szymczak EG, Barr JT, Durbin WA, Goldmann DA. Evaluation of blood culture procedures in a pediatric hospital. J Clin Microbiol 1979;9:88–92.
[3]. Greenhow TL, Hung YY, Herz AM Changing epidemiology of bacteremia in infants aged 1 week to 3 months. Pediatrics. 2012;129:e590–e596.10.1542/peds.2011-1546.
[4]. Bateman SL, Seed PC. Procession to pediatric bacteremia and sepsis: covert operations and failures in diplomacy. Pediatrics. 2010;126:137–150.10.1542/peds.2009-3169.
[5]. Isaacman DJ, Karasic RB, Reynolds EA, Kost SI. Effect of number of blood cultures and volume of blood on detection of bacteremia in children. J Pediatr. 1996;128:190–195.
[6]. Kothari A, Morgan M, Haake DA. Emerging technologies for rapid identification of bloodstream pathogens. Clin Infect Dis. 2014;59:272–278.
[7]. Pradhan R, Shrestha U, Gautam SC, Thorson S, Shrestha K, Yadav BK, et al. (2012) Bloodstream Infection among Children Presenting to a General Hospital Outpatient Clinic in Urban Nepal. PLoS ONE 7(10): e47531.
[8]. Rajesh, S., Divya, Neelaveni and Subathra. 2017. Incidence of Methicillin Resistant Staphylococcus aureus Infection in Neonatal Septicemia in a Tertiary Care Hospital. Int.J.Curr.Microbiol.App.Sci. 6(5): 2874-2881.
[9]. Lamiaa Mohsen, Nermin Ramy, Dalia Saied, Dina Akmal, Niveen Salama, Mona M. Abdel Haleima, Hany Aly. Emerging antimicrobial resistance in early and late-onset neonatal sepsis. Antimicrobial Resistance & Infection Control2017**6**:63

Dr. Sanjeev Das. "A Cross Sectional Study to Assess the Blood Stream Infection Amongst the Neonates, Infants And Children in A Tertiary Care Set Up of Eastern India." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 16.12 (2017): 46-48