ORIGINAL ARTICLE

Bacteria isolated from Blood Cultures of Septicemic children at a teaching Unit

TAHIR MAHMOOD[1], NAIMA JAVED[2], HABIB SUBHANI[3], *FARAH AMIR ALI*[4]

ABSTRACT

Septicemia is the most prevalent ailment in children responsible for extreme illness and death. For the diagnosis of septicemia, the aim is to separate bacterial agents from blood cultures. For detection of factor responsible for infection in children, this retrospective study was carried out from January 2013 to January 2015 in the Pathology Department of Aziz Fatima Hospital, Faisalabad. 31.3% was culture positive out of a total of 2500 cultures. Gram-negative bacteria were 65.3% and 34.7% were gram positive. The most common bacteria detected were *Escherichia coli* (40.4%) which were sensitive to Ciprofloxacin, Clavulinate-Amoxyl, Gentamycin and Ceftriaxone. Ceftriaxone was most desirable among the antibiotics and the use of these antibiotics with supervision studies is advised to preserve their therapeutic efficiency.

Keywords: Blood culture, septicaemia, bacteria

INTRODUCTION

Sepsis is a common symptomatic disease in children which is having a high rate of morbidity and mortality[1]. These children have fever, trouble breathing, tachycardia and discomfort, rejection of food or exhaustion[2]. Apart from improvements in sanitation, anti-microbial therapy and reassuring treatment, blood borne infections remain important cause of illness and deaths which can reach to 20-30% in the United States. It is a medical situation that requires treatment with reasonable antibiotics[3].

To access these infections blood culture is the only way and permits for successful revival of bacteria in 99% of patients having septicemia[4]. Positive blood culture reports have been recorded in previous studies conducted in Faisalabad[5]. In this region, the outcome of therapy is poor, having deaths of about 33 to 41%[6,7,8,9].

The knowledge of epidemiology is required for optimal management of neonatal sepsis. *Escherichia coli, Pseudomonas aeruginosa*, *Enterobacter species, Klebsiella pneumonia and Staphylococcus aureus* are the commonly detected bacteria.

Profiling of bacteria and their antibiotic sensitivity pattern leads to the management of infection and the rational use of antibiotics in this region. The pattern of bacterial strains in children with clinical diagnosis of septicemia seen in a teaching hospital in Faisalabad is taken into account in this study.

---

[1]*Assistant Professor Paediatrics,*
[2]*Professor of Pharmacology*
[3]*Professor of Medicine*
[4]*Associate Professor Physiology*
Aziz Fatima Medical & Dental College, Faisalabad
Correspondence to Dr. Muhammad Tahir Email: farah.zulfiqar@yahoo.com Cell: 0321-6614121, 0346-6689004

MATERIALS & METHODS

The current retrospective study was performed in children who are under 15 years of age with septicemia and model sensitivity to antibiotics from January 2013 to January 2015 in a teaching unit.

After thorough cleaning of venous site, blood samples were collected and injected into Brain Heart infusion Broth and were categorized into groups A, B and C. These broths were incubated at 37 C for 7 days and three sub-cultures were prepared on MacConkey, Blood and chocolate media. They were incubated according to standard procedures. Organisms were isolated and susceptibility tests for antibiotics were done.

The obtained results were analyzed on SPSS 11 and statistical analysis done, p values <0.05 were considered to be significant.

RESULTS

Out of 2500 samples, 784 (31.3%) were culture positive. Gram negative bacteria were 65.3% and gram positive were 34.7%. *E.coli* were the most common bacteria isolated (40.4%) followed by *S. aureus* (27.1%) and *Klebsiella sp.* (18.7%). The ratio of gram positive and gram negative were 2:1.

Bacterial isolates according to age groups; A (newborns), B (> 28 days to <1 year) and C (1 year to < 15 years) were 34.6%, 30.7% and 28.1% respectively. *E.coli* outweighed in all three groups by 48.3%, 35% and 34% in groups A, B and C respectively. *S. aureus* comprises 25.8%, 30% and 27% in groups respectively. The least widespread was *Haemophilus influenza* found only in group C and reported for only 0.8% of the isolates in this group (Table 1).

E. coli was susceptible to Ciprofloxacin, Ceftriaxone and Ceftaxidime by 86%, 84% and 82% respectively. 85% of *S. aureus* was sensitive to Clindamycin, Clavilinate + Amoxycillin while 81 % was sensitive to Ceftriaxone, and 76% to Gentamicin.

Table 1: Allocation of bacterial isolates in three groups in Jan. 2013—Jan 2015

Bacteria isolated	Age Groups			
	Group A (newborns) (%)	Group B (> 28/7, 12/12) (%)	Group C (1 < 15 years) (%)	Total (%)
E. coli	165 (48.3)	70 (35)	82 (34)	317 (40.4)
Staphylococcus aureus	88(25.8)	60 (30)	65 (27)	213 (27.1)
Klebsiella spp	57(17)	40 (20)	50 (21)	147 (18.7)
Proteus spp	29(8.5)	18 (9)	15(6.1)	62 (7.9)
Salmonella spp	--	4 (2)	12 (5)	16 (2)
Streptococcuspneumonia	1 (0.3)	2 (1)	5(2)	8 (1.0)
Pseudomonas aeruginosa	--	4 (2)	7 (2.8)	9 (1.1)
Enterococcus spp	1 (0.3)	2 (1)	5 (2)	8 (1.0)
Haemophilus influenza	--	--	2 (0.8)	2 (0.2)
Total isolates	341 (34.6)	200 (30.7)	243 (28.1)	784 (31.3)
Sterile (negative) cultures	644 (65.3)	450 (69.2)	622 (72)	1716 (68.6)
Total cultures	985 (39.4)	650 (26)	865(34.6)	2500

Table 2: Isolated Bacteria& antibiotic sensitivity pattern among study inhabitants in Aziz Fatima hospital, 2013--2015

	Bacteria Isolated								
Drugs	E.coli 327(%)	S.aureus 223(%)	Klebsiella 157(%)	Proteus 62(%)	P.aruginosa 9(%)	Salmonella 16(%)	S.pneumonia 8(%)	Enterococcus 8(%)	H. influenza 2(%)
Pen.	--	--	--	--	--	--	4(50)	6(75)	--
Amp.	150(46)	--	55(35)	25(40)	2(22)	12(75)	4(50)	--	2(100)
Chlo.	39(12)	120(54)	50(32)	12(19)	2(22)	13(81)	5(63)	4(50)	2(100)
Eryth.	--	120(54)	--	--	--	--	5(63)	2(25)	2(100)
Gent.	251(77)	170(76)	50(32)	28(45)	5(56)	13(81)	6(75)	4(50)	2(100)
Cipro.	282(86)	--	90(57)	35(56)	8(89)	7(44)	2(25)	4(50)	2(100)
Ceftr.	275(84)	180(81)	--	24(39)	--	15(94)	6(75)	--	2(100)
Cefta.	270(82)	--	90(57)	--	9(100)	--	--	--	--
Cefu.	--	75(34)	68(43)	--	--	12(75)	6(75)	7(88)	2(100)
Clav+ Amox	252(77)	190(85)	90(57)	24(39)	6(67)	12(75)	6(75)	7(88)	2(100)
Clind	--	190(85)	--	--	--	--	--	--	--
Cotr	160(49)	--	--	18(29)	2(22)	9(56)	3(38)	2(25)	1(50)
Clox	--	160(72)	--	--	--	--	--	--	--

Pen. = Penicillin;Chlo = Chloramphenicol; Clox. = Cloxacillin; Eryth. = Erythromycin; Amp. = Ampicillin; Gent. = Gentamicin;Ceftr. = Ceftriaxone;Cefu.= Cefuroxime; Clav. + Amox. = Clavulinate + Amoxycillin; Ceft. = Ceftazidime; Clind. = Clindamycin; Cotr.= Cotrimoxazole; Cipro. = Ciprofloxacin

DISCUSSION

The bacteria isolated from culture of blood at a rate of 31.3% were comparatively low when compared to some work already done[11]. In the current study, a rate of 34.6% isolation of bacteria was obtained from group A (newborns), while 30.7% & 28.1% were from blood cultures of group B and group C respectively. The rate of bacterial isolation in newborns (34.6%) was near to 32% rate as obtained from previous studies done[12]. The advanced incidence of sepsis in newborns as compared to other younger age groups may be considered to be due to their immature immunity.

It was noted that out of total of 65.3% gram negative bacteria isolated, the main bacteria is *E. coli* (40.4%). Some studies have shown the prevalence of *S. aureus* as bacterial cause of septicemia in newborns, it shows that highest proportion of any of the bacterial isolates whether gram positive or gram negative, is dependent upon the location of the environment and time.

Gentamicin is an antibiotic relatively easy to obtain, useful against gram positive and negative organisms. Commonly it is used with beta lactam antibiotics or vancomycin for experiential therapy of infective endocarditis[13]. Ciprofloxacin is also useful but is not recommended for use in children[13].

The present study demonstrated that Ceftriaxone can be used as a drug of choice for experiential management of infection in smaller age groups. It is classified as a third generation cephalosporin and chronic use of this drug has been connected with formation of gall bladder sludge which is reversible when the drug is stopped[14].

A rationale use of antibiotics in this young age group in order to accomplish a great level antibiotic activity against the aberrant bacterial organisms was needed.

In conclusion, *E. coli* is the widespread bacteria which is isolated and is accountable for causing septicemia in all young age groups. In the end, in case of non-availability of antibiotic susceptibility report, Ceftriaxone may be thought to be a primary agent for empirical management of septicemia in this age group in Faisalabad.

REFERENCES

1. Odugbemi T. Oduyebo O, Animashaun T. Typhoid fever – microbiologic aspect. Niger. Postgraduate Med. J. 1:39—43; 1994.
2. Ogunleye VO, Ogunleye AO, Ajuwape ATP, Olawole OM, Adetosoye A. Childhood septicemia due to salmonella sprcies in Ibadan, Nigeria. Afr.J. Biomed. Res. 8:131—134; 2005.
3. Washington, J.A. and Iistrup, D.M. Blood cultures issues and controversies. Rev. Infect. Dis. 8: 792—802.
4. Wagner, G. E. Bacteremia and septicemia. In : Kingsbury, D.T., and Wagner. G.E. (eds) Microbiology. 2nd edition. John Wiely & sons. Inc., USA. Pp. 315—320.
5. Bennet, R., Eriksson, M., and Zetterstrom, R. Increasing incidence of neonatal septicemia: causative organism and predisposing risk factors. Acta pediatr. Scand., 70:207—210; 1981.
6. Karpuch, J., Goldberg, M., and Kohelet, D. Neonatal bacteremia. A 4-year prospective study. Isr. J. Med. Sci., 19:963—966; 1983.
7. Bennet, R., Eriksson, M., and Zetterstrom, R. Changes in the incidence and spectrum of neonatal septicemia during a different year period. Acta pediatr. Scand., 78: 687—690; 1985.
8. Speer, C.P., Hauptmann, D., Stubbe P., and Gahr, M. Neonatal septicemia and meningitis in Gottingen, West Germany. Pediatric Infec. Dis., 4:36—41; 1985.
9. Tessin, B., and Thiringer, K. Incidence and etiology of neonatal septicemia and meningitis in western Sweden 1975—1986. Acta. Pediatr. Scand., 79:1023—1030; 1990.
10. Murray PR, Baron EJO, Jorgensen JH, Pfaller MA, Yolken RH. Manual of clinical microbiology. 8th Ed., Washington DC. ASM Press. 1: 56—66; 2003.
11. Martin MM, Chukwuemeka EN, Anne EA, Joseph UO, Simon EA. Bacterial isolates from blood cultures of children with suspected septicemia in Calabar Nigeria. BMC Infec. Dis. 5:110;2005.
12. Mokuola Ao, Jiya N, Adesiyun OO. Neonatal septicemia in Ilorin: Bacterial pathogens and antibiotic sensitivity pattern. Afr. J. Med. Sci. 31: 127—130; 2002.
13. Madhu S, Nidji G, Uma C, Ritu A and Arora DR. Bacteremia in children. Indian J. Ped. 69:1029—1031;2002.
14. Adolf WK. Cephalosporins, In: Mandell G L, Bennett J E, Dollin R, editors. Mandell, Douglas and Practice of infectious diseases, 5th edition, New York: Churchill Livingstone 1: 279; 2000.