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Letter to the Editor

Antimicrobial susceptibility associated with bloodstream infections in children: a referral hospital-based study

Dear Editor,

Bacterial pathogens are becoming more and more resistant to antibiotics used commonly by healthcare practitioners. Despite introduction of new antibiotics, empiric treatment of patients with bloodstream infections (BSIs) became a major challenge for practicing physicians.[1,2]

To depict the susceptibility patterns of BSI pathogens endemic in a referral pediatric hospital, Children's Medical Center (Tehran, Iran), the antimicrobial susceptibility patterns among 3593 patients were reviewed in a 5-year period (2006–2010). Bacterial identification and disk diffusion susceptibility testing were performed, using standard methods.[3]

Percentages of Gram positive and Gram negative bacteria were 35% (1265/3593) and 65% (2328/3593), respectively. *Enterobacter spp*. (25.9%), *Pseudomonas aeroginosa* (25.5%), and *Coagulase-negative staphylococci* (CoNS) (23.2%) were the most frequent agents, followed by *Staphylococcus aureus* (6.2%) and *Klebsiella spp.* (5.9%), collectively accounting for 87% of all BSI blood isolates cultured. were *Staphylococcus spp*., followed by *Viridans group streptococci*, *Streptococcus pneumonia*, and *Entrococcus spp*. comprised about 84% of all Gram positive bacteria isolated from blood cultures. Among Gram negative bacteria, *Enterbacter spp.*, *Pseudomonas aeruginosa*, *Klebsiella spp.*, *E. coli*, and *Salmonella spp.* accounted for about 95% of isolates. Table 1 shows the antimicrobial susceptibility pattern of Gram positive and Gram negative bacteria in this study. CoNS are almost always resistant to oxacillin. Furthermore, the rate of susceptibility is very low among *S. aureus* (13.2%) and *S. pneumoniae* (7%). Vancomycin showed an acceptable antibiotic effect on CoNS, *S. aureus*, *S. pneumoniae* and viridans group *Streptococci*, with susceptibility rates of 93.2%, 95.3%, 96.4% and 92.7%, respectively. Among staphylococcal isolates *S. aureus* was more susceptible to clindamycin (82.9% *versus* 52.9%) and to trimethoprim/sulfamethoxazole (60.9% *versus* 34.0%) than CoNS. *S. pneumoniae* was highly susceptible to ceftriaxone (93.9%), cefalotin (96.6%), and vancomycin (96.4%). About half of the *Klebsiella spp.* isolates tested were resistant to amikacin. The rate of resistance to ampicillin, ceftriaxone and piperacillin-tazobactam was as high as 97.7%, 66.7% and 35.4%, respectively. The rate of *E. coli* resistance to amikacin was similar to that of *Klebsiella spp.* On the contrary, Imipenem showed to be quite effective in both organisms (Table 1).

Although bacteriologic culture is the keystone of management of septicemia, culture result takes time; therefore, understanding the regional bacterial susceptibility and pattern of resistance to antimicrobial agents is very important to prepare treatment guidelines. In two previous studies conducted in the same hospital during 1995–2000 and 2001–2005, the prevalence of Gram positive bacteria was reported as 72.0% and 47.6%, respectively.[4,5] However, the recent data showed that the Gram negative microorganisms have become much more prevalent. These data also show that the pattern of antimicrobial resistance in Iran is different from other parts of the world. Thus, based on the observed changes therapeutic regimens prescribed by health practitioners in Iran should be modified.

Table 1 – Antimicrobial susceptibility profile of isolated bacteria.

Bacteria	Antimicrobial	Total no.	Percent susceptible
Gram positive bacteria			
Viridans group streptococci	Ceftriaxone	71.6	67
	Clindamycin	67	77.6
	Chloramphenicol	40	82.5
	Erythromycin	65	52.3
	Penicillin	37	40.5
	Vancomycin	110	92.7
Enterococcus spp.	Chloramphenicol	13	69.2
	Erythromycin	17	11.8

Table 1 (*Continuación*)

Bacteria	Antimicrobial	Total no.	Percent susceptible
	Gentamicin	28	25
	Penicillin	12	8.3
	Vancomycin	29	62.1
Gram negative bacteria			
Klebsiella spp.	Amikacin	148	48.0
	Ampicillin	133	2.3
	Ceftriaxone	129	33.3
	Cefalotin	153	11.8
	Chloramphenicol	82	52.4
	Trimethoprim/sulfamethoxazole	178	57.3
	Gentamicin	206	44.2
	Imipenem	76	97.3
	Cefepime	141	73.0
	Ceftazidime	121	67.8
Escherichia coli	Amikacin	71	53.0
	Ampicillin	63	12.7
	Ceftriaxone	64	50.0
	Cefalotin	87	33.3
	Chloramphenicol	43	79.1
	Trimethoprim/sulfamethoxazole	100	27.0
	Gentamicin	108	61.1
	Imipenem	33	97.0
	Tobramycin	66.7	36.0
	Piperacillin-Tazobactam	91	70.3
Pseudomonas aeruginosa	Amikacin	617	39.4
	Ceftazidime	558	16.3
	Ceftriaxone	547	7.9
	Chloramphenicol	456	30.2
	Ciprofloxacin	481	94.6
	Gentamycin	904	41.6
	Kanamycin	473	4.6
	Imipenem	91	68.1
	Tobramycin	329	30.7
Enterobacter spp.	Amikacin	715	93.4
	Ampicillin	708	4.1
	Ceftriaxone	679	92.3
	Chloramphenicol	695	85.5
	Ciprofloxacin	693	99.4
	Trimethoprim/sulfamethoxazole	847	92.9
	Gentamicin	867	93.5
	Kanamycin	577	76.1
	Imipenem	23	87.0
	Tobramycin	507	94.1
	Piperacillin-Tazobactam	343	73.8
Salmonella spp.	Amikacin	24	100
	Ampicillin	21	71.4
	Cefalotin	24	87.5
	Chloramphenicol	10	90.0
	Trimethoprim/sulfamethoxazole	31	83.9
	Kanamycin	9	88.8
	Gentamicin	36	94.4
	Imipenem	6	100
	Tobramycin	10	100
	Piperacillin-Tazobactam	31	71.0
Acinetobacter spp.	Amikacin	12	58.3
	Chloramphenicol	6	50.0
	Kanamycin	7	28.6
	Gentamicin	18	66.7
	Tobramycin	6	33.3
Haemophilus spp.	Amikacin	12	66.7
	Ceftriaxone	10	80.0
	Chloramphenicol	7	71.4
	Trimethoprim/sulfamethoxazole	19	36.8
	Kanamycin	6	33.3

Table 1 (*Continuación*)

Bacteria	Antimicrobial	Total no.	Percent susceptible
	Gentamicin	20	65.0
	Imipenem	4	100
	Penicillin	4	100
	Tobramycin	6	83.3

Conflict of interest

The authors declare no conflict of interest.

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Mohammad Taghi Haghi Ashtiani[a], Setareh Mamishi[b], Ahmad Masoomi[a], Nafiseh Nasiri[a], Mohammad Hosseini[a], Bahram Nikmanesh[a], Babak Pourakbari[b], Nima Rezaei[c,d,e,*]

[a] *Pediatrics Center of Excellence, Children's Medical Center, Tehran University of Medical Sciences, Tehran, Iran*

[b] *Pediatric Infectious Disease Research Center, Tehran University of Medical Sciences, Tehran, Iran*

[c] *Research Center for Immunodeficiencies, Children's Medical Center, Tehran University of Medical Sciences, Tehran, Iran*

[d] *Molecular Immunology Research Center, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

[e] *Department of Immunology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

[*] *Corresponding author at*: Children's Medical Center Hospital, 62 Qarib St, Keshavarz Blvd, Tehran 14194, Iran.
E-mail address: rezaei_nima@tums.ac.ir (N. Rezaei).

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