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Pathogenic Bacteria and their Susceptibility to Antimicrobial Agents at Abouzar Children Hospital, Ahvaz, Iran

Les bactéries pathogènes et leur susceptibilité aux agents antimicrobiens à l'hôpital pédiatrique Abouzar, Ahvaz, Iran

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Abstract

Background: Antibiotic-resistant Gram negative bacteria are increasingly emerging as serious causes of infections than ever before.

Materials and Methods: This retrospective study examined the pattern of pathogenic bacterial isolates and their susceptibilities to antimicrobial agents at Abouzar Children Hospital, Ahavz-Iran, between Jan and July 2005.

Results: Of the 216 bacterial isolates from 193 patients, 156 (72.3%) were from urine, 25 (11.6%) from blood, 10 (4.7%) from stool, 14 (6.4%) from cerebrospinal fluid, 5 (2.3%) from wound and 6 (2.7%) from sputum. The organisms included E. coli 121 (56%), Klebsiella pneumoniae 30 (13.9%), Pseudomonas aeruginosa 20 (9.3%), S. aureus 16 (7.4%), Shigella spp 7 (3.3%), S. typhi 7 (3.2%), Enterobacter spp 4 (1.8%), Heamophillus influenza 6 (2.8%), Pneumococcus 3 (1.4%), Citrobacter spp 1 (0.5%), Neisseria spp 1 (0.5%). Of the 121 E. coli isolated, 73.8 % and 73.6 % were resistant to Nalidixic acid and Nitroforantoin, respectively; another 69.6 % these isolates were resistant to Co-trimaxazole. Similarly, 66 % and 44 % of Klebsiella pneumoniae and Pseudomonas aeruginosa were resistant to Co-trimaxazole.

Conclusion: There is a high prevalence of urinary tract infections and high incidence of multi-drug resistant bacteria, particularly gram negative bacteria, at Abouzar children hospital.

Keywords: Bacteria, resistance, children.

Résumé

Arrière-plan: Les bactéries gram négatives résistantes aux antibiotiques s'avèrent plus que jamais des causes sérieuses d'infections. ***Matières et méthodes:*** Entre janvier et juillet 2005, cette étude rétrospective a examiné la disposition de bactéries pathogènes à l'état pur et leur susceptibilité aux agents antimicrobiens à l'hôpital pédiatrique Abouzar, Ahvaz-Iran. ***Résultats:*** Sur les 216 échantillons bactériens prélevés à 193 malades, il y avait 156 (72,3%) spécimens d'urine, 25 (11,6%) de sang, 10 (4,7%) de selle, 14 (6,4%) de fluide cérébro-spinal, 5 (2,3%) de blessure et 6 (2,7%) de crachat. Les organismes identifiés comprennent la E. coli 121 (56%), la pneumonie Klebsiella 30 (13,9%), la Pseudomonas aeruginosa 20 (9,3%), la S. aureus 16 (7,4%), la shigellose spp 7 (3,3%), la S. typhus 7 (3,2%), l'entérobactérie spp 4 (1,8%), la grippe heamophillus 6 (2,8%), la pneumocoque 3 (1,4%), la citrobactérie spp 1 (0,5%), la Neisseria spp 1 (0,5%). Sur les 121 échantillons de la E. coli isolés, 73.8% et 73.6% étaient résistants à l'acide nalidixique et à l'acide nitroforantoin, respectivement,; 69.6% encore des échantillons étaient résistants à la co-trimaxazole. De même, 66% et 44% des échantillons de pneumonie Klebsiella et la pseudomonas aeruginosa étaient résistants à la co-trimaxazole. ***Conclusion:*** A l'hôpital pédiatrique Abouzar, il y a une grande prévalence d'infections de l'appareil urinaire et une fréquence élevée de bactéries dont, en particulier, les bactéries gram négatives, qui sont résistantes à plusieurs médicaments. ***Mots-clés:*** *Bactéries, résistance, enfants.*

Introduction

Antimicrobial resistance in pathogenic bacteria is a public health problem that has been on the increase in recent years. The World Health Organization (WHO) and Centre for Diseases Control (CDC) have recognized the importance of studying the determi-nants of resistance as well as the need for control strategies.[1,2]

Gram-negative bacteria particularly E. coli, Klebsiella pneumoniae, and Pseudomonas

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aeruginosa are the most frequent causes of life-threatening systemic infections[3-8]. Bacterial isolation in children during infections is very poorly documented in Ahvaz. The present study aims to investigate the incidence of bacterial pathogens isolated from different clinical specimens obtained from children at Abouzar children hospital in Ahvaz and the susceptibility of these isolates to various antimicrobial agents.

Materials and Methods

The records of all the children aged 12 years and below, who were managed at Abouzar children hospital between Jan and July 2005 were retrospectively reviewed. Abouzar children hospital is an academic hospital affiliated to Ahvaz Jundi-Shapour University of Medical Science, Ahvaz, Iran. Specimens of urine, stool, blood, pus, sputum, CSF, wound and oro/nasopharyngeal swabs of patients were examined under microscope in the microbiology laboratory. Each specimen was cultured and the bacterial isolates identified using standard techniques[9].

The sensitivity patterns of the isolates were tested in vitro against the activities of nine different antibiotics: Ampicillin, Ciprofloxacin, Gentamicin, Ceftazidim, Cefotaxim, Nalidixic acid, Cotrimoxazol, Nitrofurantoin and Amikacin by disk diffusion technique using Muller Hinton agar according to National Committee for Clinical Standard (NCCLS) recommendation[10]. Analysis of data was done with SPSS version 11.5.

Table 1: Frequencies of occurrence of bacterial species isolated from children hospitalized at Abouzar children hospital.

Rank	Organisms	No. of isolates	% of isolates
1.	E. Coli	121	56
2.	Klebsiella pneumoniae	30	13.9
3.	Pseudomonas aeruginosa	20	9.3
4.	S. aureus	16	7.4
5.	Shigella spp	7	3.2
6.	S. Typhi	7	3.2
7.	Enterobacter spp	4	1.8
8.	Haemophillus influenza	6	2.8
9.	Pneumococcus	3	1.4
10	Citrobacter spp	1	0.5
11.	Neisseria spp	1	0.5

Results

Bacteria were isolated in 193 (89.35%) of the 216 children investigated. Of the 193 children, 106 (54.9%) were female and 87 (45.1%) were male. Urinary tract infection was the most common in 72.3% of cases, followed by septicaemia (11.6 %), gastro-enteritis (4.7 %) and 11.4% other infections.

The most frequently isolated pathogen was E. coli (56%), which was followed by Klebsiella pneumoniae 30 (14%), Pseudomonas aeruginosa 20 (9.3%) (Table 1). Results of the in vitro susceptibility testing of these isolated are shown in Table 2.

Over a half (69.6%) of the isolated E. coli were resistant to Co-trimaxazole. Similarly, 66% and 44% of isolated Klebsiella pneumoniae and Pseudomonas aeruginosa were resistant to Co-trimaxazole.

Discussion

The control of emergence and spread of antimicrobial resistance among the most common bacterial pathogens is probably one of the most important challenges in the scientific and medical community. Epidemiological surveillance of antibiotic resistance is indispensable for empirical treatment of infections, implementation of resistance control measures, and preventing of antibiotic resistant microorganisms.

The emergence of multi-drug resistance by certain strains of gram-negative bacteria such as Pseudo-monas, E. coli, Klebsiella, Enterobacter, Acinetobacter, Salmonella species and gram-positive organisms such as Staphylococcus, Enterococcus and Streptococcus species in this study as in others,[11,12] is a worrisome development. In our study, urinary tract infections were the most common source, followed by septicaemia. This study showed that E. coli, Klebsiella penumoniae, Pseudomonas aeruginosa, Shigella spp, and, Staphylococcus aureus play a major role in urinary tract infections. Our finding is similar to several reports from the United States and Europe.[13-15]

We like to conclude that there is a high prevalence of urinary tract infections and high incidence of multi-drug resistant bacteria,

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Table 2: Percent antibiotic resistance of bacterial species isolated from hospitalized patients at Abouzar children hospital (%)

Organism(s)	Cip	Gen	Cef	NA	Nit	Ami	Cotri
E. Coli	28.9	57.8	19.3	74.3	73.5	59.5	69.4
Klebsiella pneumoniae	13.3	36.6	16.6	28	46.6	53.3	66.6
Pseudomonas aeruginosa	18.6	ND	25	30	15	10	45
S. aureus	12.5	0.0	ND	37.5	56.3	6.3	18.8
Shigella spp	28.6	71.5	14.3	14.3	ND	57.2	42.9
S. typhi	14.3	71	0.0	ND	ND	0.0	14.3
Enterobacter spp	0.0	0.0	0.0	0.0	ND	0.0	0.0
Haemophillus influenza	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pneumococcus	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ND = Not Done; Cip = Ciprofloxacin; Gen = Gentamicin; Cef = Ceftazidim; NA = Nalidixic acid; Nitroforantoin; Ami = Amikacin; Cotri = Cotrimoxazol.

particularly gram negative bacteria, at Abouzar children hospital. A prospective may be necessary to justify this study, so as formulate necessary antibiotic therapy strategies and to assist in formulating national control measures and prescribing policies.

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