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EXTENDED SPECTRUM β-LACTAMASES (ESBL) PRODUCING ENTEROBACTERIACEAE – CHALLENGE IN THE MEDICINE PRACTICE

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ABSTRACT

The growing use of broad-spectrum cephalosporins in recent years resulted in the appearance of the ESBLs. The first extended β-lactamase, designated SHV-2, was reported inGermany in 1983. Since than more and more extended-spectrum β-lactamases have been detected across the world.
The ESBLs are capable of hydrolyzing broad-spectrum cephalosporins and are inhibited by clavulanate and tazobactam.
The purpose: to summarize the data on the detection, monitoring and epidemiology of ESBLs-producing *Enterobacteriaceae* in our hospital during 6 years period using phenotype methods.
Results: E. coli ESBLs positive – 4.8%; K. pneumoniae – 13.2%; Proteus spp. – 2.8% respectively.
Conclusions: K. pneumoniae is the most common ESBLs-producer, folowed by E. coli and Proteus spp.

Key words: Antimicrobial resistance, beta-lactams, K. pneumoniae, E. coli, Proteus spp.

INTRODUCTION

The growing use of broad-spectrum cephalosporins in recent years resulted in the appearance of the ESBLs. Now there exist a wide variety of extended-spectrum β-lactamases across the world.
The ESBLs are capable of hydrolyzing broad-spectrum cephalosporins and are inhibited by clavulanate and tazobactam(3,4).
ESBLs-producing Enterobacteriaceae represent a true challenge for the physicians and the microbiologists because of: the need of exact laboratory detection and interpretative reading of the antimicrobial susceptibility tests (AST); common therapeutic failures, and the limited choice of the avalable antibiotics(5,8).

THE AIM

Phenotype investigation on the spread of ESBLs – producing Enterobacteriaceae from University hospital patients during a six years period (2001 – 2006).

MATERIALS AND METHODS

The investigation includes 35518 specimens and 2604 isolates Enterobacteriaceae :
1417 from urine, 235 from low respiratory tract, 875 from wounds and 77 from blood.
The phenotype detection of ESBL was done according to CLSI/NCCLS 2003 using Double-Disc Synergism Method-DDS with Amoxicillin/Clavulanic acid + Ceftazidime, Cefotaxime and Cefpodoxime and Confirmatory Test discs (CAZ, CAZ-CLA; CTX, CTX-CLA), BD BBL Sensi-Disc ESBL(7).

Figure 1 – *Double-Disc Synergism Method – ESBL positive strain*

Table 1 – *Distribution of Enterobacteriaceae isolates among specimens*

Specimens Isolates	**Urine**	**Sputum**	**Wound**	**Haemoculture**	**Total (No/%)**
E. coli	1066	60	461	38	1625/62,4
K.pneumoniae	175	175	102	19	471/18,1
Proteus spp.	132	0	188	0	320/12,3
K. oxytoca	11	0	19	1	31/1,2
E. cloacae	13	0	69	13	95/3,6
E. aerogenes	14	0	36	2	52/2,0
S. marcescens	6	0	0	4	10/0,4
Total (No/%)	1417/54,4	235/9,0	875/33,6	77/3,0	2604/100

The most common isolate among Enterobacteriaceae is E. coli (62.4%), moslty from urine, followed by K. pneumoniae (18.1%) mostly from urine and sputum.

Table 2. *Relative rate of the ESBL-producing microorganisms toward all isolates*

Period Isolates	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**Total**
E. coli	331	352	207	234	236	256	1616
ESBL E. coli %	0.9	2.5	9.7	11.1	3.4	4.4	4.8
K.pneumoniae	70	89	101	74	81	56	471
ESBL K.pneumoniae %	3.0	18.0	26.7	6.7	7.4	10.7	13.2
Proteus spp.	62	44	47	46	51	68	318
ESBL Proteus spp. %	0	0	6.4	0	0	8.8	2.8

The most common ESBLs produser is K. pneumoniae (13.2%) from all K. pneumoniae isolates, followed by E. coli (4.8%) from all E. coli isolates and Proteus spp. (2.8%) from all Proteae.

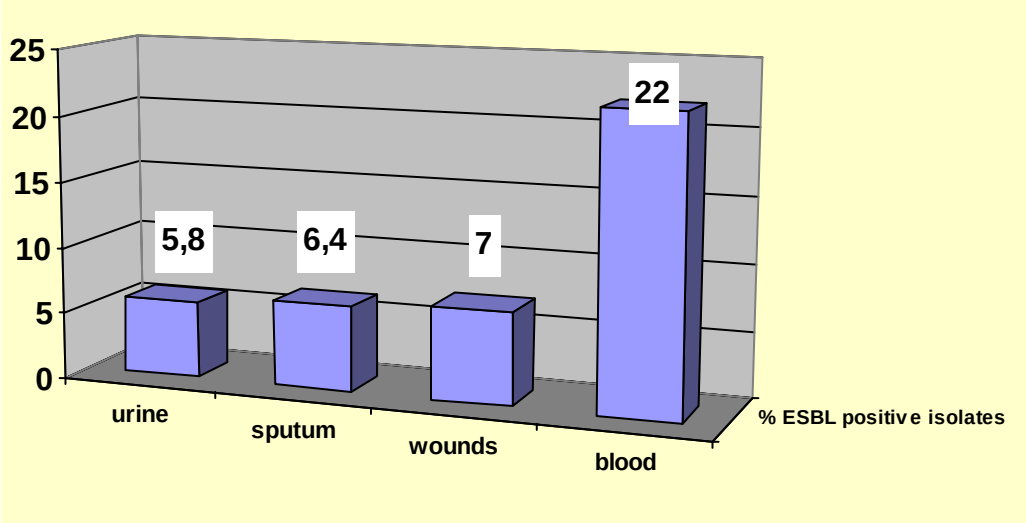

Figure 2 *ESBL-producing Enterobacteriaceae according to the specimens*

The most common specimen with ESBLs positive isolates is the blood; from the other specimens (urine, sputum, wounds) the frequence varies from 5.8% to 7.0%.

CONCLUSIONS

K. pneumoniae is the most common ESBLs-producer (13.2%), folowed by E. coli (4.8%). We established increasing of ESBls positive Enterobacteriaceae during the years, irrespective of the restrictive antimicrobial politics in the University hospital(1,2,6,9). This tendency implies measures to reduce the incidence of infections with ESBL producing Enterobacteriaceae based on:

- the improvement of the collaboration with clinicians
- the epidemiologycal control : isolation and precautions for patients with ESBLs
- monitoring of antibiotic use and hospital staff education

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