

ANTIMICROBIAL RESISTANCE PROFILES IN OUTPATIENT PAEDIATRIC URINARY TRACT INFECTIONS

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Introduction:

Urinary tract infections (UTI) are common in the pediatric age group, especially among infants and young children.

Antimicrobial resistance is a complex global public health challenge.

Antimicrobial resistance, a natural phenomenon in microorganisms, is accelerated by the selective pressure exerted by use and misuse of antimicrobial agents. Multidrug resistant (MDR) and extended-spectrum beta-lactamases (ESBL) producing Gram-negative bacteria, such as *E. coli* and *Klebsiella* spp., represent an escalating problem in medicine, but their prevalence in pediatric population is underestimated. Furthermore, ESBL-producing strains frequently harbor co-resistance genes conferring resistance to aminoglycosides, fluoroquinolones, and TMP-SMX, limiting therapeutic options with oral agents.

Objectives:

We assessed prevalence and antimicrobial resistance profile of most common uropathogens from urine cultures in outpatient children with urinary tract infections (UTI).

Methods:

A retrospective study during a 10-year period (2003-2013) was conducted upon outpatient children with community-acquired UTI, presented to ambulatory pediatric department in Cluj Napoca, Romania.

The inclusion criteria were all children between the age of 2 month and 18 years with the first episode of community-acquired UTI.

We determined the prevalence, antibiotic resistance patterns and trends of the 3 most common uropathogens, including *Escherichia coli*, *Proteus mirabilis* and *Klebsiella* spp.

The strains were identified by conventional methods. Antimicrobial susceptibility testing was performed according to Clinical and Laboratory Standards Institute (CLSI) guidelines. Gram-negative bacilli were tested for extended-spectrum beta-lactamase (ESBL) production by

double disk synergy test and organisms which showed resistance to at least three or more antibiotics of different structural classes were considered multidrug-resistant (MDR) as described elsewhere.

The frequency of resistance were stratified by age groups and gender. The data was analyzed by using GraphPad Prisma 5 and Statistica version 8 software. We generated descriptive statics, and for each antimicrobial we conducted univariable analyses and logistic regression.

Results:

Among 550 children identified with a first UTI, the majority were female (68%) and 1 to 4 years of age (33%). Overall the most frequently encountered pathogen was *E. coli* (73%), followed by *Proteus mirabilis* (11.6%) and *Klebsiella* spp. (10.2%). The prevalence of isolates gender-stratified was statistically different for *E.coli*.

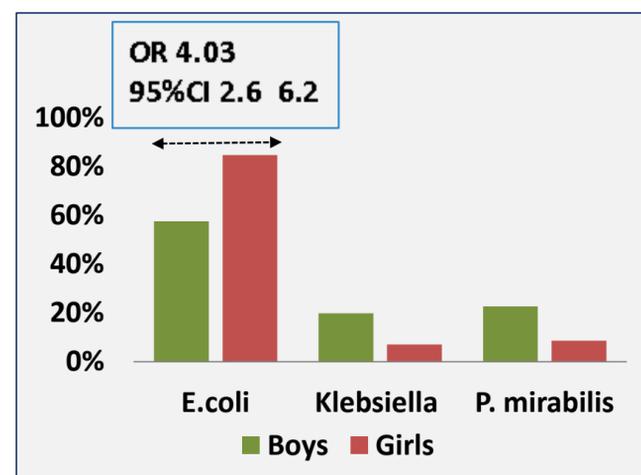


Fig.1- Prevalence of Gram-negatives pathogens gender-stratified

Regarding the main uropathogens, we found a high resistance rates for TMP/SMX, 2nd generation cephalosporins, amoxicillin-clavulanate and MDR (Fig.2). The resistance to ciprofloxacin (Fig.3) and cephalosporine 3rd generation increased with age [OR 2.34 (95%CI 1.35-4.055) and OR 2.48 (95%CI 1.149-5.353) respectively].

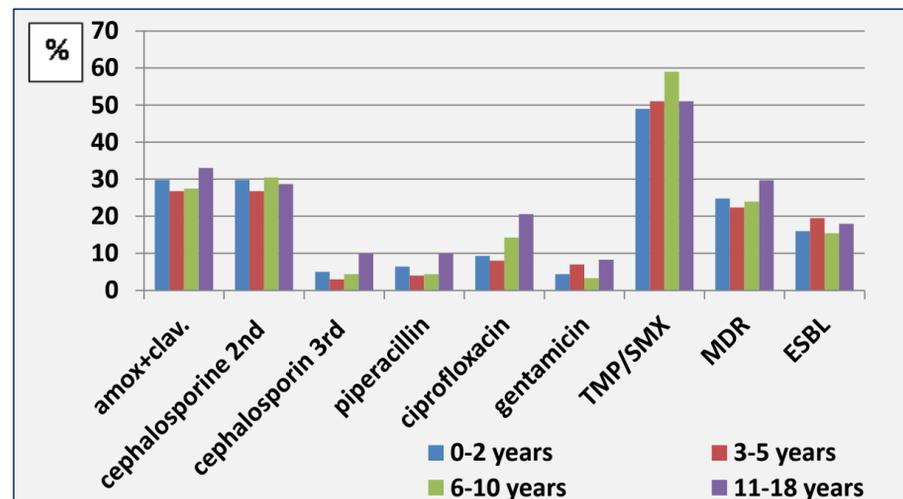


Fig.2 - Antibiotic resistance of Gram-negative uropathogens stratified by age groups

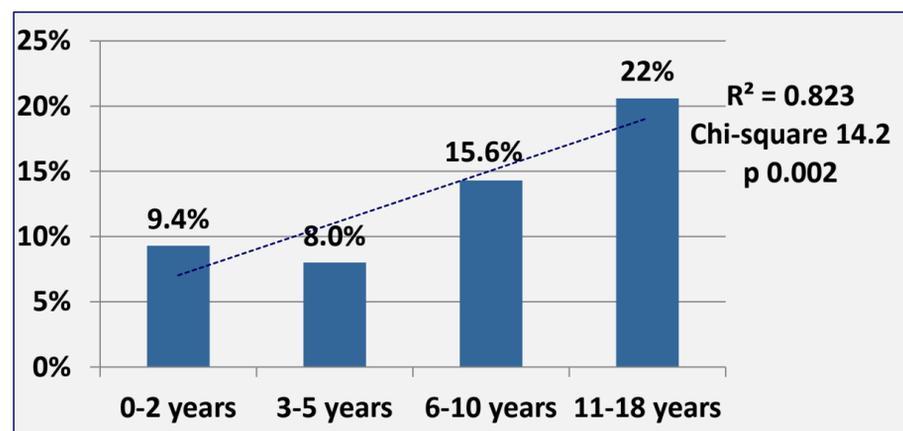


Fig.3 - Relationship between patient's age and ciprofloxacin resistance

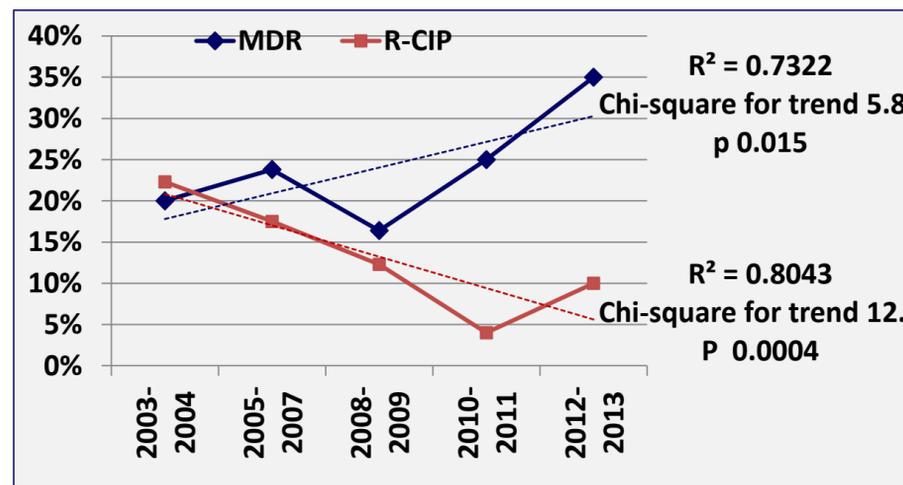


Fig.4 - The trend of multidrug resistance (MDR) and ciprofloxacin-resistance (R-CIP) over the study period

Stratified by gender, we found a significant rate of resistance to cephalosporine 2nd generation, TMP/SMX and MDR in boys (40% vs. 26%, p 0.001; 63.7% vs. 47%, p 0.04; 30% vs. 21% p 0.02, respectively).

During study period we found an increasing trend of MDR and resistance to cephalosporins

Conclusion:

- High resistance rate to common beta-lactamines and trimethoprim /sulfamethoxazole was documented in outpatient pediatric with first episode of UTI.
- The resistance to ciprofloxacin and cephalosporine increased with age.
- Multidrug-resistance strains were associated with male gender.
- An increasing trend over time of MDR was documented.
- The stratification of isolates from UTI on the basis of age and gender can improve the assessment of causative pathogens and the empiric treatment.