Introduction and Purpose

The most frequently isolated Gram-negative pathogens from patients with UTIs were E. coli (n = 770, 46.3%), Klebsiella pneumoniae (n = 246, 15.6%), P. aeruginosa (n = 96, 6.0%), Provenge (n = 93, 5.8%), and Proteus mirabilis (n = 94, 5.9%). Among E. coli and P. aeruginosa, the ESBL-positive phenotype rates were 12.0% and 13.4%, respectively (Table 1).

Almost all ESC-β-lactamase producing Enterobacteriaceae (98.4% of ESBL strains) were susceptible to Ceftolozane/tazobactam, which is in line with previous MIC studies performed in other centres as the denominator.

Ceftolozane/tazobactam was tested using a fixed dose of 4 mg/L of the β-lactamase inhibitor and compared with other extended-spectrum β-lactamase (ESBL)–producing strains. In complicated UTIs, extended-spectrum β-lactamase (ESBL)–producing strains of bacteria is common in complicated UTIs (cUTIs), and its prevalence is increasing (9).

In the current study, we evaluated the activity of ceftolozane/tazobactam and compared the in vitro activity against Gram-negative pathogenic bacteria causing UTIs in hospitals in Europe, Turkey, and Israel during 2014.

Methods

Organism collection

Organism collection included only enteric Gram-negative bacteria from hospitalised patients with a diagnosis of UTI.

- In 2014, a total of 1,075 unique patient isolates were consecutively collected from 30 participating centres (organisations) located in 21 European countries, Turkey, and Israel.

- Specimens were collected at different participating centres (organisations) in Austria (3), Belgium (4), Czech Republic (1), Denmark (1), Finland (1), France (1), Germany (1), Greece (1), Ireland (1), Italy (1), Netherlands (1), Norway (1), Portugal (1), Russia (1), Spain (3), Sweden (2), Switzerland (1), Turkey (2), Ukraine (1) and United Kingdom (3).

- Species identification was performed at the participating medical centres and was confirmed at the monitoring laboratory (JMI laboratories) using MALDI-TOF mass spectrometry (Bruker, Billerica, MA, USA), when necessary.

Antimicrobial susceptibility testing

- Isolates were tested for susceptibility to multiple antimicrobial agents at a fixed dose of 4 mg/L of the β-lactamase inhibitor (Table 1).
- Minimum inhibitory concentration (MIC) results were interpreted according to CLSI and EUCAST guidelines for most antimicrobial agents (10, 11). The CLSI and EUCAST interpretative criteria for each antimicrobial agent are shown in Table 1.
- MIC determination was performed using automated microdilution methods, as described in Clinical and Laboratory Standards Interpretation Societies guidelines.
- Organisms were further divided into two groups: ESBL producers (MIC of ≥2 mg/L for Enterobacteriaceae and ≥4 mg/L for P. aeruginosa) and non-ESBL producers (MIC of ≤1 mg/L for Enterobacteriaceae and ≤2 mg/L for P. aeruginosa, respectively (12)).
- To reach a conclusion regarding a resistance phenotype, resistance was interpreted as follows: resistance ≥64 mg/L, intermediate susceptibility 16 to 64 mg/L, and susceptible ≤16 mg/L.

Conclusions

- Ceftolozane/tazobactam exhibited potent activity against ESBL-producing pathogens, including many ESBL-phenotype strains, which is in line with previous MIC studies performed in other centres as the denominator.
- In complicated UTIs, extended-spectrum β-lactamase (ESBL)–producing strains of bacteria is common in complicated UTIs (cUTIs), and its prevalence is increasing (9).
- In the current study, we evaluated the activity of ceftolozane/tazobactam and compared the in vitro activity against Gram-negative pathogenic bacteria causing UTIs in hospitals in Europe, Turkey, and Israel during 2014.

Results

The in vitro antimicrobial activity of ceftolozane/tazobactam and comparator agents against Gram-negative pathogens isolated from 2014 collected in Europe, Turkey and Israel.

- The highly isolated Gram-negative pathogens from patients with UTIs were E. coli (n = 770, 46.3%), Klebsiella pneumoniae (n = 246, 15.6%), P. aeruginosa (n = 96, 6.0%), Provenge (n = 93, 5.8%), and Proteus mirabilis (n = 94, 5.9%). Among E. coli and P. aeruginosa, the ESBL-positive phenotype rates were 12.0% and 13.4%, respectively (Table 1).
- Almost all ESC-β-lactamase producing Enterobacteriaceae (98.4% of ESBL strains) were susceptible to Ceftolozane/tazobactam, which is in line with previous MIC studies performed in other centres as the denominator.
- The activity of ceftolozane/tazobactam was very active against most Enterobacteriaceae, including many ESBL-phenotype strains; however, activity was compromised against ESBL-phenotype P. aeruginosa (2).
- Similar to other β-lactams, ceftolozane/tazobactam demonstrated limited activity against the small number of non-ESBL P. aeruginosa and non-ESBL P. aeruginosa spp.

References


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