

INTISARI

Latar Belakang:

Enterobacteriaceae merupakan penyebab berbagai infeksi, terutama infeksi nosokomial dengan morbiditas dan mortalitas tinggi. Produksi enzim AmpC β -laktamase dan Extended-Spectrum β -Lactamase (ESBL) pada *Enterobacteriaceae* berkontribusi meningkatkan resistensi sefalosporin. Ko-produksi AmpC dan ESBL menimbulkan tantangan klinis yang besar karena pola resistensi yang lebih luas dan membatasi pilihan terapi.

Tujuan:

Mengevaluasi tingkat resistensi bakteri *Enterobacteriaceae* penghasil enzim AmpC β -laktamase dengan *Enterobacteriaceae* penghasil enzim AmpC β -laktamase dan ESBL terhadap sefalosporin.

Metode:

Penelitian ini menggunakan desain potong lintang menggunakan isolat *Enterobacteriaceae* (*E. coli*, *K. pneumoniae*, dan *P. mirabilis*). Deteksi AmpC β -laktamase menggunakan uji cakram AmpC dengan asam fenil boronat, sedangkan deteksi ESBL menggunakan sistem Vitek2 dan/atau uji konfirmasi sesuai kriteria ESBL. Uji sensitivitas antibiotik sefalosporin dilakukan dan dianalisis secara statistik menggunakan uji *Chi-square* untuk menilai perbedaan antar kelompok. Nilai $p < 0,05$ dianggap bermakna secara statistik.

Hasil:

Jumlah isolat *Enterobacteriaceae* sebanyak 137 terdiri dari 62 isolat *E. coli*, 42 *K. pneumoniae*, dan 27 isolat *P. mirabilis*. Isolat penghasil enzim AmpC β -laktamase, penghasil enzim ESBL, dan penghasil keduanya secara berturut-turut sebanyak 33, 53, dan 20. Isolat *Enterobacteriaceae* yang bukan penghasil kedua enzim sebanyak 31 isolat. Perbandingan tingkat resistensi diantara empat kelompok isolat *Enterobacteriaceae* menurut jenis sefalosporin menunjukkan perbedaan yang bermakna ($p < 0,001$). Tingkat resistensi *Enterobacteriaceae* penghasil enzim AmpC β -laktamase terhadap sefazolin, seftriakson, seftazidim, dan sefepim secara berturut-turut sebesar 75,8%, 60,6%, 42,4% dan 39,4%. Tingkat resistensi *Enterobacteriaceae* penghasil enzim AmpC β -laktamase dan ESBL terhadap sefazolin, seftriakson, seftazidim, dan sefepim secara berturut-turut sebesar 95%, 90%, 75%, dan 35%. Secara keseluruhan isolat *Enterobacteriaceae* penghasil kedua enzim tersebut memiliki tingkat resistensi yang lebih tinggi secara bermakna ($p < 0,001$).

Simpulan:

Isolat klinis *Enterobacteriaceae* penghasil enzim AmpC β -laktamase dan ESBL menunjukkan tingkat resistensi yang lebih tinggi terhadap sefalosporin secara bermakna dibandingkan isolat klinis penghasil AmpC β -laktamase.

Kata kunci: *Enterobacteriaceae*, AmpC β -laktamase, ESBL, Resisten, Sefalosporin.

ABSTRACT

Background:

Enterobacteriaceae are major causes of various infections, particularly nosocomial infections, and are associated with high morbidity and mortality rates. The production of AmpC β -lactamase and extended-spectrum β -lactamase (ESBL) by Enterobacteriaceae contributes to increasing resistance to cephalosporins. Co-production of AmpC and ESBL poses greater clinical challenges due to broader resistance patterns and limited therapeutic options.

Objective:

To evaluate the resistance levels of Enterobacteriaceae producing only AmpC β -lactamase enzymes compared to those producing both AmpC β -lactamase and ESBL enzymes against sefalosporin.

Methods:

This study employed a cross-sectional design using clinical isolates of Enterobacteriaceae (*E. coli*, *K. pneumoniae*, and *P. mirabilis*). Detection of AmpC β -lactamase was performed using the AmpC disk test with phenylboronic acid, while ESBL production was identified using the Vitek2 system and/or confirmatory tests according to ESBL criteria. Antimicrobial susceptibility testing for cephalosporins was conducted and statistically analyzed using the Chi-square test to assess differences between groups. A p-value < 0.05 was considered statistically significant.

Results:

A total of 137 Enterobacteriaceae isolates were identified, including 62 *E. coli*, 42 *K. pneumoniae*, and 27 *P. mirabilis*. Among these isolates, 33 produced AmpC β -lactamase, 53 produced ESBL, and 20 co-produced both enzymes, while 31 isolates produced neither enzyme. Comparison of resistance rates among the four groups of Enterobacteriaceae isolates according to cephalosporin type demonstrated a significant difference ($p < 0.001$). The resistance rates of AmpC β -lactamase-producing Enterobacteriaceae to cefazolin, ceftriaxone, ceftazidime, and cefepime were 75.8%, 60.6%, 42.4%, and 39.4%, respectively. Meanwhile, isolates co-producing AmpC β -lactamase and ESBL showed resistance rates of 95%, 90%, 75%, and 35%, respectively. Overall, isolates producing both enzymes exhibited significantly higher resistance rates ($p < 0.001$).

Conclusion:

Clinical isolates of Enterobacteriaceae producing both AmpC β -lactamase and ESBL showed significantly higher resistance to cephalosporins compared with isolates producing AmpC β -lactamase.

Keywords:

Enterobacteriaceae, AmpC β -lactamase, extended-spectrum β -lactamase, resistance, cephalosporins.