Journal of Advances in Developmental Research (IJAIDR)

E-ISSN: 0976-4844 ● Website: www.ijaidr.com ● Email: editor@ijaidr.com

Decoding AmpC β-lactamase production: cefotaxime zone extension as an additional feature

Dr. Gopal Agrawal[1], Dr. Sarfaraz Ahmed[2], Dr. Nishu Sharma[3]

Professor and Head[1], Associate Professor[2], Senior Resident[3]
Department of Microbiology, Indira Gandhi Government Medical College, Nagpur, Maharashtra, India

Antimicrobial resistance among Gram-negative bacilli remains a major challenge in clinical microbiology, largely due to β-lactamase-mediated mechanisms. We report a phenotypic observation suggestive of AmpC β-lactamase production noted during routine antimicrobial susceptibility testing.

Antimicrobial susceptibility testing was performed by the Kirby–Bauer disk diffusion method (Figure 1) [1,2]. An apparent enhancement of the cefotaxime inhibition zone in proximity to the cefoxitin–cloxacillin (CXX) disk suggested a possible synergistic effect warranting further evaluation.

The isolate was resistant to cefoxitin, a recognized screening marker for AmpC production [3], along with reduced susceptibility to third-generation cephalosporins such as cefotaxime. It remained susceptible to imipenem, making carbapenemase production unlikely. The absence of zone enhancement around the amoxicillin–clavulanate disk argued against classical extended-spectrum β-lactamase activity, since AmpC enzymes are typically not inhibited by clavulanic acid [4].

The isolate also appeared to show blunting of inhibition zones between cefotaxime and known inducers, namely imipenem, cefoxitin, and amoxicillin–clavulanate, and a similar effect between aztreonam and amoxicillin–clavulanate, suggesting inducible AmpC activity [4]. An additional, often unnoticed feature was enhancement of the cefotaxime zone adjacent to the CXX disk.

These findings underscore the importance of meticulous interpretation of routine susceptibility testing, especially where molecular diagnostics are unavailable [5]. Early recognition of AmpC producers is essential, as these organisms pose therapeutic challenges and may necessitate carbapenems or other reserve agents [6]; missed detection can lead to inappropriate therapy and further spread of resistance.

We recommend routine screening for AmpC β-lactamase production in isolates exhibiting cefoxitin resistance, with confirmatory inhibitor-based or molecular testing wherever feasible [3,7,8]. This observation reinforces the value of careful phenotypic analysis in guiding antimicrobial therapy and strengthening infection control practices.

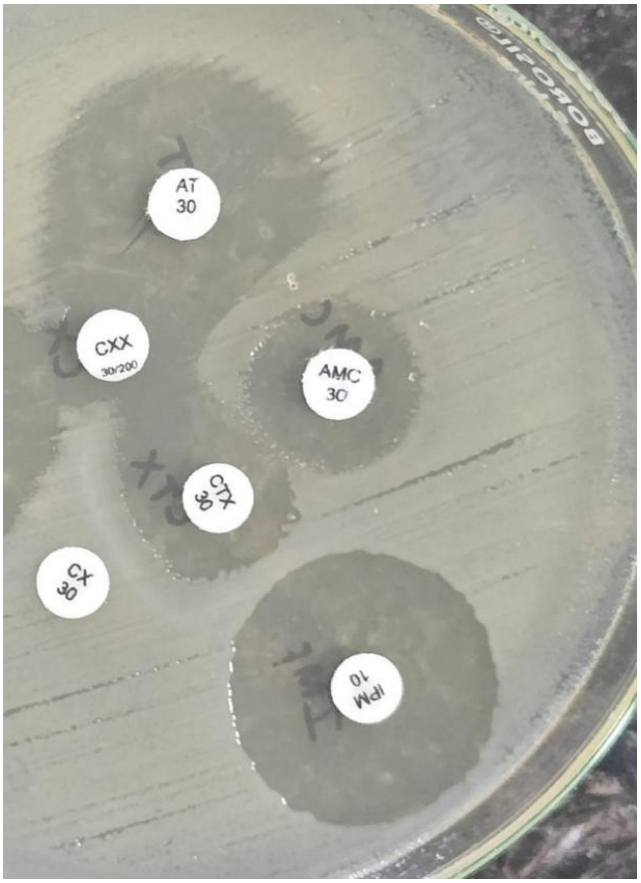


Figure 1. Kirby–Bauer disk diffusion antimicrobial susceptibility testing with aztreonam (AT), cefoxitin–cloxacillin (CXX), amoxicillin–clavulanate (AMC), cefotaxime (CTX), cefoxitin (CX) and imipenem (IPM) disks. There is no inhibition zone around CX but a clear zone around CXX. The cefotaxime (CTX) inhibition zone is enhanced in proximity to the CXX disk, an additional phenotypic feature suggestive of AmpC β-lactamase production.

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