STUDENTS' CORNER
LETTER TO THE EDITOR

A novel antibiotic, clovibactin, holds promise in the battle against superbugs

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Dear Madam, Increased mortality and morbidity in bacterial infections are strongly correlated with antibiotic resistance. Controlling multidrug resistance patterns in Gram-positive and Gram-negative bacteria could jeopardise antibiotic effectiveness. There needs to be more effective treatment interventions, a shortage of effective prophylactic measures, and a restricted supply of newly developed antibiotics. As a result, there exists an urgent necessity to investigate novel therapeutic approaches and alternative antibacterial agents.

In Pakistan, the presence of methicillin-resistant *Staphylococcus aureus* (MRSA) was detected in around 49% of the total reported cases of *Staphylococcus aureus*.[1] *Staphylococcus aureus* demonstrates a notable degree of resistance to penicillin, with subsequent resistance observed towards cefoxitin and levofloxacin. E. coli exhibits significant resistance to penicillin, cephalosporin, ampicillin, and amoxicillin.[1] The presence of vancomycin-resistant *Enterococcus strains* can be attributed to the phenomenon wherein around 11.57% of individuals harbouring this bacterium exhibit resistance to vancomycin. The resistance of Vancomycin-Resistant *Enterococci* (VRE) was highest against ampicillin, while erythromycin and gentamicin exhibited comparatively lower levels of resistance.[2]

According to predictions, it is expected that by the year 2050, the yearly mortality rate that is the result of antimicrobial drug resistance will reach an astonishing amount of 10 million individuals.[3] However, the emergence of a novel antibiotic known as clovibactin instills a sense of optimism.[4] The antibiotic clovibactin was derived from uncultivated soil microorganisms. Despite minimal resistance, clovibactin effectively eliminates drug-resistant Gram-positive bacterial infections. Clovibactin targets the pyrophosphate component of essential peptidoglycan precursors to suppress cell wall synthesis. Due to its hydrophobic interface, clovibactin encloses pyrophosphate without affecting precursor structural components, preventing resistance. Selective and effective target binding is achieved by sequestering precursors into supramolecular fibrils, which only form on bacterial membranes with lipid-anchored pyrophosphate groups. This powerful antibiotic may help develop new treatments that remove bacterial infections without causing resistance.[4] Clovibactin demonstrated antimicrobial efficacy against a diverse array of gram-positive pathogens, encompassing methicillin-resistant *S. aureus*, daptomycin-resistant, and vancomycin-resistant strains of *S. aureus*, as well as challenging-to-treat vancomycin-resistant *Enterococcus faecalis* and *E. faecium* (vancomycin-resistant enterococci). The impact on *Escherichia coli* was minimal compared to an *E. coli* WO153 strain lacking an outer membrane, perhaps due to inadequate compound penetration.[4]

Further research, particularly in the context of human subjects, is required to ascertain the antibiotic's potential as a viable therapy option. Meanwhile, it is imperative to uphold rules pertaining to the appropriate utilization of antibiotics to mitigate the emergence and spread of antibiotic resistance.

Disclaimer: None.

Conflict of interest: None.

Funding disclosure: None.

DOI: https://doi.org/10.47391/JPMA.11043

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Submission complete: 04-10-2023 **Review began:** 14-12-2023
Acceptance: 18-04-2024 **Review end:** 27-03-2024

Author Contribution:
AB: Literature search, proofreading and final approval. SHS: Proofreading and critically analyzed.
BF: Design and writing. All authors agree for all aspects of the work.