Title- Fighting Back Against Resistance: Evaluating Novel Antimicrobials Against Multidrug-Resistant Enterobacteriaceae

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Introduction: Multidrug-resistant organisms (MDROs) among Enterobacteriaceae pose a growing challenge, complicating clinical management. Strengthening surveillance, fostering collaborative networks, and advancing innovative partnerships have contributed to the development of next-generation antimicrobials. Addressing AMR requires a comprehensive One Health approach

Among these, **plazomicin** and **cefepime–enmetazobactam** represent important therapeutic advances.

Aim & Objectives: To evaluate the in vitro activity of plazomicin and cefepime–enmetazobactam against MDR *E. coli* and *K. pneumoniae*, identify key resistance mechanisms, compare their performance with routine antibiotics, and support their appropriate use in antimicrobial stewardship.

Material and methods- A cross-sectional, observational study was conducted over six months (May 2025–October 2025). Clinical samples—urine, blood, respiratory specimens, and skin/soft tissue samples—showing significant bacterial growth were included duplicate samples were excluded.They were processed as per standard protocols using CLED, MA from BD and pre- prepared Blood Agar & Chocolate Agar plated from Biomerieux. Antimicrobial susceptibility testing was performed using the disc diffusion method following Clinical and Laboratory Standards Institute (CLSI) guidelines. Sensitivity to plazomicin and cefepime–enmetazobactam was assessed. ESBL, MBL, KPC, and AmpC enzymes were detected as per CLSI recommendations. Data were analysed using SPSS software.

Observation & Result: A total of 131 Enterobacteriaceae isolates were recovered, comprising *E. coli* (n=87) and *K. pneumoniae* (n=44). Resistance mechanism analysis confirmed the presence of **ESBL, MBL, KPC, and AmpC enzymes**, with their distribution shown in **Figure 1**. The overall susceptibility patterns of the isolates are summarised in **Figure 2**. Isolates lacking MBL production (n=55) were evaluated for susceptibility to the new antimicrobials and compared to MBL producers as shown in **Figure 3**.

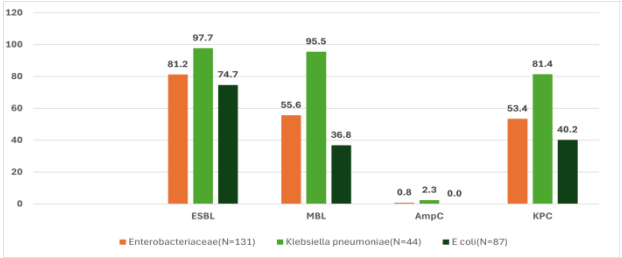

Fig.1 Prevalance of resistant enzymes among isolates

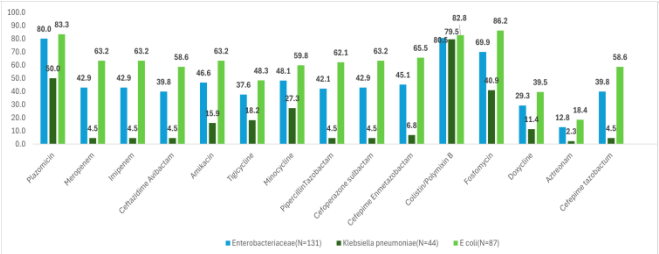

Fig.2 Antibiotic susceptibility pattern of isolates

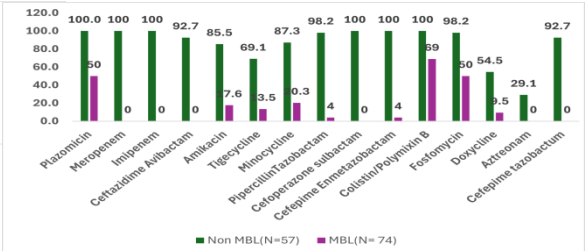

Fig.3 Antibiotic susceptibility pattern of MBL Producers and non – MBL PRODUCERS

Discussion & Conclusion- Plazomicin appears to be a promising therapeutic option for treating infections caused by resistant Enterobacteriaceae, offering potential benefits as a carbapenem- and colistin-sparing agent. Cefepime–enmetazobactam shows high efficacy against non-MBL isolates; however, given the high prevalence of carbapenemase producers in intensive care settings in India, its role as an empirical agent may be limited. This study underscores the strategic placement of these novel antimicrobials in institutional antibiotic policies and highlights their importance in preserving last-resort drugs.

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