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News & Comments

BMD Assay Revealed a Similar Resistance Pattern between Colistin and Polymyxin B

Andrea Ricky

Before their discontinuation due to their toxicity, which manifested as nephrotoxicity and neurotoxicity, polymyxin antibiotics were frequently employed in the treatment of severe infections brought on by gram-negative bacilli. Li et alpaper.'s state that among other Enterobacteriaceae, polymyxins resistance has been discovered in *P. aeruginosa, A. baumannii,* and *Campylobacter* species (spp.), including *K. pneumoniae*. Bacterial resistance to polymyxins has been noted for more than a decade4,5 and evidence suggests that chromosomal changes are to blame. The plasmid mcr-1 gene is carried by a variety of Enterobacteriaceae, according to documented evidence. Using the guidelines and suggestions of CLSI19, compare the effects of colistin and polymyxin B on bacterial growth inhibition. Lastly, ascertain whether the isolates' DNA carries the mcr-1 gene.

Therefore, the purpose of this investigation was to study any potential Colistin resistance in clinical isolates of the Enterobacteriaceae that were obtained from ICU patients.

Colistimethate sodium (Hikma, Italy), polymyxin B sulphate (Schaumburg, IL, USA), a Colistin Etest strip (AB Biodisk, BioMerieux, Sweden), a Colistin 10 L disc (Condalab, Torrejon de Ardoz, Madrid, Spain), and a Qiagen DNA extraction kit (Qiagen, Germany). Ninety-one gram-negative bacterial isolates, including 28 strains each of *Acinetobacter baumannii*, *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa,* and *Shigella flexneri*, were employed in this investigation (1), Isolates came from clinical samples used in patient treatment and kept in the Laboratory of Microbiology Division's -80 microbank at the College of Medicine. The overnight growth that resulted was once more plated out on MacConkey agar, cultured under the same circumstances, and used for bacterium identification and an antibiotic susceptibility test. The analysis of data was done using statistical software (SPSS, version 23, USA).

A total of 91 clinical isolates with origins from various clinical samples were included in the investigation. None of the isolates tested against the antibiotics colistin, minocycline, ticarcillin/clavulanic acid, ampicillin/sulbactam, amoxicillin, and ampicillin was responsive to them, according to an automated antimicrobial assay performed by the Vitek compact system. Nine of the 15 antibiotics evaluated for Acinetobacter baumannii isolates (ampicillin/sulbactam, ticarcillin/clavulanic acid, piperacillin/tazobactam, ceftazidime, imipenem, meropenem, ciprofloxacin, levofloxacin, colistin) showed 100% resistance. The Acinetobacter baumannii isolates did not exhibit any extremely significant or large mistakes (neither false susceptibility nor fake resistance). This analysis emphasizes

once more the significant threats to global health posed by resistant bacterial isolates.

A more thorough analysis will be required for each GNB isolate due to the hypothesis that early identification of mcr-positive bacteria could aid in both strain containment and the prompt and appropriate delivery of antimicrobial medication.

The performance of colistin and polymyxin B utilizing the BMD assay exhibited notable similarities based on the findings of the current investigation. Isolates included in this investigation can therefore be categorized by CLSI 2020 criteria. This work adds to the evidence that the mcr-1 gene-carrying plasmid may eventually be swapped into the chromosome, leading to the development of a genotype that is more stable. Therefore, chromosomal mcr-1 genes were found in the current investigation. It is hypothesized that the event remodels the bacterial chromosome, promoting the emergence of polymyxin resistance.

Globally, MDR clinical isolates are becoming more and more resistant to colistin and polymyxin B. This study looked at MDR clinical isolates and discovered that they had MDR, XDR, or CRE traits. Isolates were determined to be 96, 89, 96, and 100% resistant, respectively, using the Vitek Compact 2 automated system, disc diffusion, Etest, and BMD (also for comparison). The study also revealed a strong correlation between the colistin and polymyxin B tests and the BMD test.

JOURNAL REFERENCE

Emeka, P.M., L.I. Badger-Emeka, E. Estrella, G.B. Angeles and H.E.K. Ahmed, 2022. Investigation of colistin and polymyxin B on clinical extreme resistant *Enterobacteriaceae* isolates for surveillance purposes. Int. J. Pharmacol., 18: 699-713.

KEYWORDS

Polymyxin B, colistin, susceptibility, extremely drug-resistant, mcr-1 gene, gram-negative bacteria