COMBATING MULTIDRUG-RESISTANT KLEBSIELLA PNEUMONIAE: SYNERGISTIC DRUG INTERACTIONS AND RESISTANCE PROFILES

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Antimicrobial resistance (AMR) in Klebsiella pneumoniae has emerged as a serious public health threat, particularly in healthcare facilities where it is a leading cause of community-acquired and hospital-associated infections. Resistance often complicates therapy and is associated with higher mortality, especially among patients in intensive care units and neonates.

This study aimed to investigate the antimicrobial resistance profile, underlying resistance mechanisms, and the potential synergistic effects of repurposed FDA-approved drugs in combination with conventional antibiotics against clinical isolates of Klebsiella pneumoniae from Surat, India.

A total of 2,954 K. pneumoniae isolates were obtained from clinical specimens collected at diagnostic centers in Surat, India, between 2021 and 2024. Isolates were identified and characterized using biochemical and phenotypic assays. Antimicrobial susceptibility was assessed, and molecular methods were employed to detect resistance genes. Potential synergistic effects between repurposed FDA-approved drugs and conventional antibiotics were evaluated through minimum inhibitory concentration (MIC) assays.

High levels of resistance were observed against multiple antibiotic classes, with 99.5% resistance to ampicillin. Molecular analysis revealed frequent detection of resistance genes including CTX-M, NDM-1, KPC, and SHV. Combination testing demonstrated that MMV675968, when used with colistin and solithromycin, reduced MIC values of resistant isolates by 2–4 folds, suggesting significant synergistic interactions.

The findings highlight the urgent need for robust surveillance, molecular diagnostics, and innovative therapeutic strategies to address AMR in K. pneumoniae. Synergistic drug combinations, particularly those involving repurposed agents, show promise for improving treatment outcomes and reducing the burden of multidrug-resistant infections.

Keywords: Antimicrobial resistance, Klebsiella pneumoniae, multidrug resistance, antimicrobial susceptibility, synergistic therapy