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Synergistic Effect of Eugenol Acetate with Betalactam Antibiotic on Betalactamase and Its Bioinformatics Analysis

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Abstract : Beta-lactam antibiotics are the most frequently prescribed medications in modern medicine. The antibiotic resistance by the production of enzyme beta-lactamase is an important mechanism seen in microorganisms. Resistance to beta-lactams mediated by beta-lactamases can be overcome successfully with the use of beta-lactamase inhibitors. New generations of the antibiotics contain mostly synthetic compounds, and many side effects have been reported for them. Combinations of beta-lactam and beta-lactamase inhibitors have become one of the most successful antimicrobial strategies in the current scenario of bacterial infections. Plant-based drugs are very cheap and having lesser adverse effect than synthetic compounds. The synergistic effect of eugenol acetate with beta-lactams restores the activity of beta-lactams, allowing their continued clinical use. It is reported here the enhanced inhibitory effect of phytochemical, eugenol acetate, isolated from the plant Syzygium aromaticum with beta-lactams on beta-lactamase. The compound was found to have synergistic effect with the antibiotic amoxicillin against antibiotic-resistant strain of S.aureus. The enzyme was purified from the organism and incubated with the compound. The assay showed that the compound could inhibit the enzymatic activity of beta-lactamase. Modeling and molecular docking studies indicated that the compound can fit into the active site of beta-lactamase and can mask the important residue for hydrolysis of beta-lactams. The synergistic effects of eugenol acetate with beta-lactam antibiotics may justify, the use of these plant compounds for the preparation of β-lactamase inhibitors against β-lactam resistant S.aureus.

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