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Design, synthesis, biological assessment, and *in silico* analysis of bisthiazolidine amide derivatives as potential anti-bacterial and anti-prostate cancer agents

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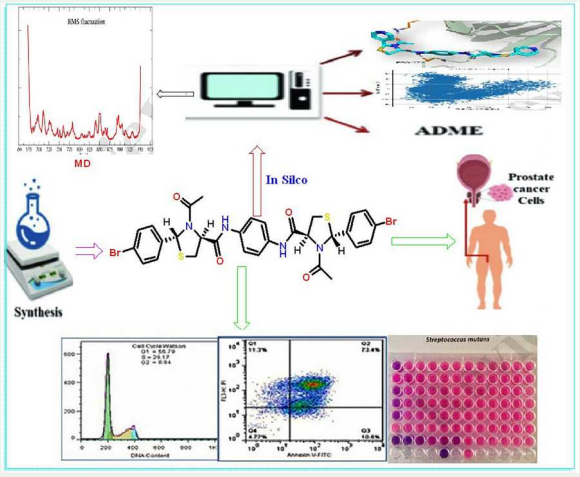
ABSTRACT

A series of N,N′-(1,4-phenylene) bis(3-acetyl-2-arylthiazolidine-4-carboxamide) derivatives (M1-M5) was synthesized, characterized, and evaluated for antibacterial and anticancer activities. Literature from 2000 to 2023 was reviewed using PubMed and Scopus to guide compound selection. Structural characterization was confirmed via FT-IR, ^{1}H, ^{13}C-NMR, and mass spectrometry. Antibacterial activity was assessed using the disk diffusion method against *S. aureus*, *E. coli*, and *S. mutans*, with M4, M5, and M3 surpassing cefixime, exhibiting MIC values of 9.7, 39.5, and 79 µg/ML against *S. aureus*. M3 and M5 also showed notable activity against *S. mutans*. MTT assays revealed potent cytotoxicity of M4, M5, and M3 against PC3 cells, with M4 (IC50 = 19.56 µg/ML) outperforming Darolutamide drug (IC50 = 52.82 µg/ML). Molecular docking suggested EGFR inhibition. M4 induced apoptosis and G1 phase arrest in PC3 cells, demonstrating its potential as a dual-purpose therapeutic agent.



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