Republic of Iraq
Ministry of Higher Education and Scientific Research
University of Basrah
College of Pharmacy

Synthesis, Characterization and Biological Evaluation of Some Sulfa Drug Derivatives

A Thesis
Submitted to the Department of Pharmaceutical Chemistry and the Committee of Graduate Studies of the College of Pharmacy-University of Basrah in Partial Fulfillment of the Requirement for the Degree of Master in Pharmaceutical Chemistry

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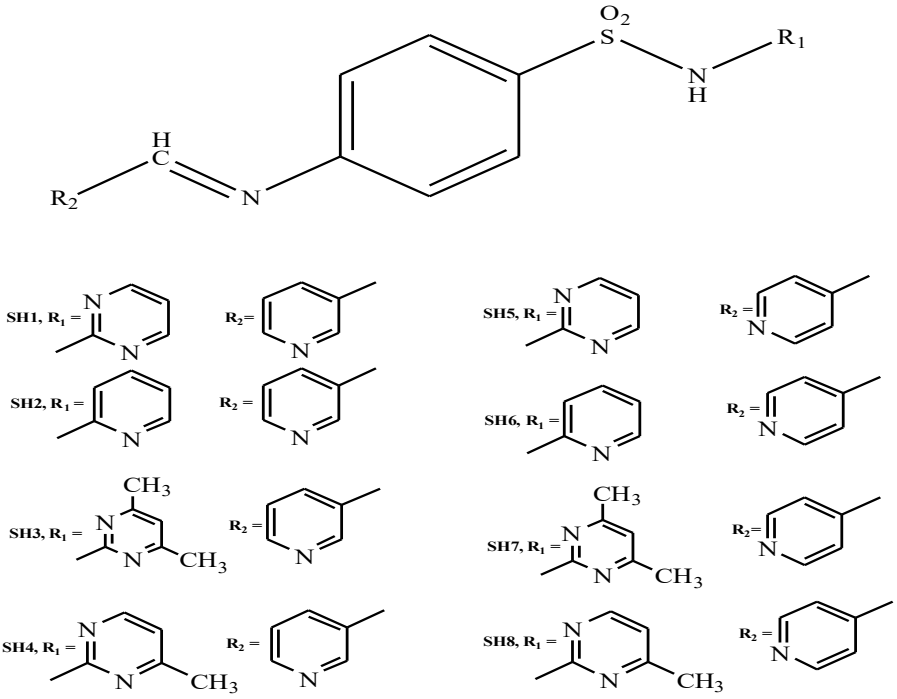
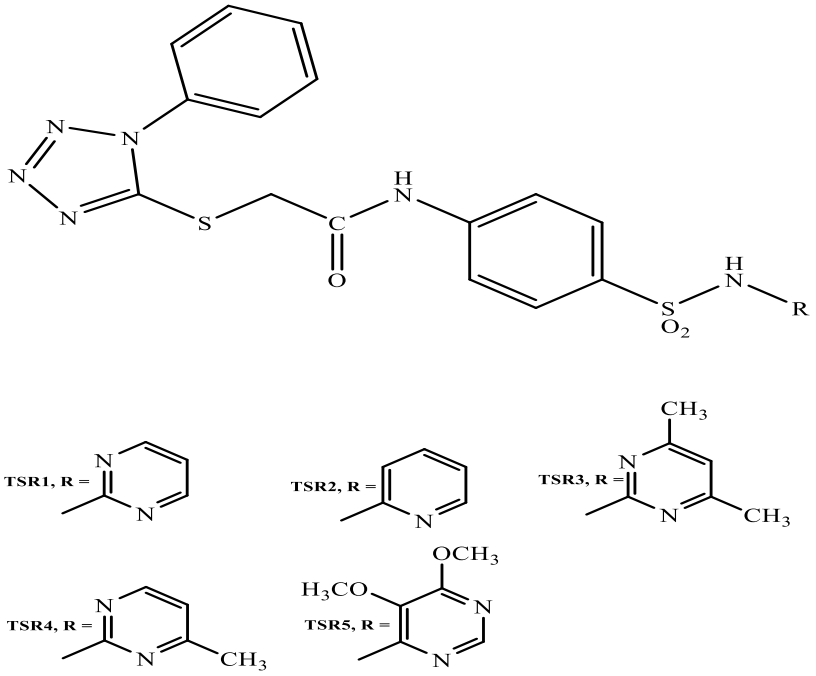
Abstract

This study includes the synthesis of two new series of sulfonamide derivatives: Sulfonamide Schiff base derivatives (SH1-SH8) and Sulfonamide tetrazole derivatives (TSR1-TSR5). All these synthesized compounds were analyzed by mass spectroscopy as well as FT-IR and ^{1}H-NMR to confirm the chemical structure of these compounds. The purity of all compounds were verified using pre-coated TLC plates using dichloromethane : methanol (9:1) solvent system. The chromatographic plates were viewed under ultraviolet light at 254 nm.



The Chemical Structure of Sulfonamide Schiff Base Derivatives



The Chemical Structure of Sulfonamide Tetrazole Derivatives

In addition, this study involves in vitro evaluation of antibacterial activity of all synthesized compounds against two pathogenic gram-positive bacteria (*Staphylococcus aureus, Streptococcus spp*.) and two pathogenic gram-negative bacteria (*Escherichia coli, Klebsiella pneumonia*) by measuring their inhibition zone versus (Ceftriaxone) as standard drug with concentrations (500, 750 and 1000) µg/ml.

Computational simulation of antibacterial activity of these compounds binding to the protein dihydropteroate synthase (DHPS) using molecular docking assay has been studied too, and also studying their preliminary anti-tumor activity against human (MCF-7) cell line.

The antibacterial results for sulfonamide Schiff base compounds reported that at high concentration, compound SH7 showed better antibacterial activity among other derivatives against all tested bacteria, while sulfonamide tetrazole derivatives reported that at high concentration, both TSR3 and TSR5 displayed better activity among others against all tested bacteria, whereas all synthesized compounds exhibited less antibacterial activity compared to standard drug ceftriaxone.

On the other hand, molecular docking results for the synthesized compounds using both MOE and Auto Dock Vina programs, showed that compounds SH7, TSR3 and TSR5 displayed best affinity value among other sulfonamide Schiff base and sulfonamide tetrazole derivatives respectively and this confirmed with their experimental result.

In addition, the preliminary result of anti-tumor activity assigned that among all synthesized sulfonamide derivatives, compound TSR3 has higher efficacy of suppression on MCF-7 cell line of breast cancer.