Indian Journal of Chemistry
Vol. 64, July 2025, pp. 724-729
DOI: 10.56042/ijc.v64i7.15507

Efficient and green approach for the synthesis of indolyl-pyrimidine derivatives and investigation of biological assays

Prabhakar Chavan

Department of Studies and Research in Chemistry, Sahyadri Science College, Kuvempu University, Shivamogga 577 203, Karnataka, India

E-mail: prabhakarchavan7@gmail.com

Received 4 December 2024; accepted (revised) 1 July 2025

The present study reports the synthesis of biologically active chalcones **3a–d** and indolyl-pyrimidine derivatives **5a–d**. The newly synthesized compounds have been characterized using physicochemical techniques, including melting point determination, thin-layer chromatography (TLC), and spectral methods such as infrared (IR) spectroscopy, ^{1}H and ^{13}C NMR, and mass spectrometry. This synthetic approach is advantageous due to its simplicity, cost-effectiveness, and mild reaction conditions. Among the synthesized compounds, compounds **3d** and **5b** exhibit notable radical scavenging activity (RSA) at a concentration of 25 µg/mL, compounds **3a, 3c, 3d, 5b** and **5c** show good RSA at 75 µg/mL. **5c** exhibits good RSA at concentration of 50 µg/mL. Compound **3a** shows best result at a concentration of 75 µg/mL. Compound **3b** demonstrates potent activity with an MIC of 62.5 µg/mL against *Escherichia coli* (MTCC-723) and equipotent activity (125µg/mL) against all other tested bacteria. Compound **3a** shows potent activity (62.5µg/mL) against *Staphylococcus aureus* (ATCC-29513). **3a** exhibits potent activity (62.5 µg/mL) against *Aspergillus niger* (MTCC-281). Compound **3a** exhibits excellent activity against *M. tuberculosis* H37Rv, with an MIC of 3.125 µg/mL, which is comparable to the standard drugs Pyrazinamide (MIC 3.125 µg/mL) and superior to Streptomycin (MIC 6.25 µg/mL). Compounds **3d** and **5c** shows good activity with MIC values of 6.25 µg/mL against *M. tuberculosis* H37Rv.

Keywords: Synthesis, Indolyl-pyrimidine, Antioxidant, Antimicrobial activity, Antitubercular activity