



Synthesis, Identification and Study of the Anti-microbial activity of Novel

Chalcone and Epoxy chalcone compounds

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Abstract

In this study, new chalcone and epoxy chalcone synthesized by condensation of 4-acetophenyl with the appropriate aldehydes. The epoxy chalcone prepared via the reaction chalcone with alkaline hydrogen peroxide in methanol. We characterized their mass spectra and ^1H - ^{13}C -NMR, and 2D-HSQC spectra to confirm their structure and absolute configuration. The target compounds were then screened for their potential antibacterial and antifungal activities. Most of the tested chalcone compounds had better activity against the fungal strains *Fusarium* and *Aspergillus niger*.

Keywords: Chalcone; Epoxy Chalcone; Green Chemistry; anti microbial activity.

Introduction

Chalcones have many biological properties due to the enone pharmacophore in their structure and their low molecular weight. They are easy to prepare cost-effectively and could be developed as drug candidates for different diseases. Chalcones showed a broad spectrum of biological properties including anti-inflammatory, anticancer, antibacterial, antifungal, and antiviral [1-6]. They are also intermediates and precursors for different cyclic compounds such as isoxazole, pyrimidines, pyrazolines, etc [7]. Other applications of chalcones are in an organic solar cell [8], liquid crystals [9], anti corrosion effects [10], and in polymers [11]. The Wittig-Scheffer reaction uses hydrogen peroxide under alkaline conditions and is the most powerful way to oxidize a chalcone into an epoxy chalcone; it is an example of green chemistry [12-13]. Epoxy chalcone has excellent biological and pharmaceutical activities [14-16] and is intermediates and precursors for a wide range of chiral compounds and natural products [17-19]. As well as, life-threatening infections caused by pathogenic bacteria and fungi that are becoming increasingly general and widely extensive epidemics in the world make many research groups from all over the world to prevent novel antibacterial and antifungal agents to overcome the emergence of various infectious diseases and the increasing number of multi drug resistant microbial organisms [20-21]. Here, in this

work, we prepared new chalcones and epoxy chalcones and characterized them spectroscopically as well as examine products with novel central compounds as potential antibacterial and antifungal agents.

Experimental

Chemicals and Instruments

All the chemicals ordered from Sigma-Aldrich (Saint Louis, USA). A mass spectrophotometer (Shimadzu, QP5050A, Japan) used for the electron impact (EI Mass) at Tebrah University, Iraq. Nuclear magnetic resonance measurements carried out in Turkey and Iran. The ^1H and ^{13}C -NMR spectrometry carried out at the Tebrah University, Iran using a Bruker (500 MHz) spectrometer. Other ^1H and ^{13}C NMR spectra and HSQC obtained on a Bruker BioSpin GmbH-400 MHz spectrometer at a laboratory in Turkey using $\text{DMSO}-d_6$ as a solvent for all compounds except EI compounds. Gal used a CDCl_3 solvent and tetramethylsilane (TMS) as an internal reference. The TLC plates made of 20- μm silica gel mesh with a thickness of 2 mm (Merck). The names of the compounds given according to the IUPAC system.

Chemistry

Synthesis of Chalcones compounds CH1-CH10

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