Research Article

Synthesis, characterization and biological activity of some glycolylurea and β-lactam merged heterocyclic compounds

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Abstract

Objective: The chemistry of β-lactams has established a prestigious role in organic and medicinal chemistry. The combination of these derivatives with other medicinally important class like glycolylurea might give some more applicable compounds. The objective of the present work was the synthesis and characterization of glycolylurea derivatives of some β-lactams. The synthesis involving formation of glycolylurea derivatives followed by the condensation was performed as per previously used methods. **Materials and Methods:** The synthesized compounds were characterized by various physico-chemical and analytical methods including FTIR and NMR spectroscopy. All the compounds were also investigated for their antimicrobial activity on gram negative and gram positive microbial cultures. **Results and conclusions:** It was found that from the investigated compounds one compound G5 mono-chloro derivative with one methyl group at ortho position was found active against gram nagetive microbes *P. aeruginosa* and G7 di-chloro derivative with one methyl group at ortho position was found active against gram positive microbes *B. subtilis*. Four out of eight compounds are moderately active against *E. coli.* Except G8 all the synthesized compounds are less or very less active against selected fungal stains.

Keywords: Glycolylurea, β-lactams, antimicrobial activity

Introduction

Glycolylurea is also known as Hydantoin and its derivatives are widely applicable heterocyclic compounds for many diseases like anticunvalsant (Singh et al., 2005; Mistry and Desai, 2012; Sudani and Desai, 2015), antiepilepsy (Anger et al., 2001; Rogawski and Loscher, 2004), antihypertensive (Menendez et al., 1992; Dylag et al., 2004) and many more. It is now well known that the β-lactam ring is part of the core structure of many antibiotic families and due that some of them are also called β-lactam antibiotics (Donowitz and Mandell, 1988). Aruna and Indra, (2018) showed the importance of the β-lactam compounds in various antibiotics including urinary tract infection (UTI). This class of compounds has played an important role in medicinal chemistry as broad spectrum antibiotic compound maker. Both of these classes had performed well in synthetic pharmacy.

There are many derivatives synthesized with these moieties in order to get better activities. In present work some derivatives of glycolylurea were synthesized as per the known route and than they were condensed with cyclization to form β-lactam merged compounds with the prediction of better antibacterial activities

Materials and Methods

All the chemicals and reagents were of analytical reagent (AR) grade, they were used without further purification. IR spectra were recorded on Bruker ALPHA FTIR spectrophotometer in KBr pellets. The H-NMR spectra were recorded on Bruker Avance II spectrometer in d-DMSO. Chemical shifts relative to TMS used as internal standard were obtained in d unit. The melting points were determined in open capillary tubes on SUNBIM apparatus and are uncorrected.

Synthesis of different compounds

Compounds **h1** to **h4** were synthesized with the previously used method. These eight compounds were than treated with

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