Hindawi Publishing Corporation
International Journal of Medicinal Chemistry
Volume 2015, Article ID 571836, 10 pages
http://dx.doi.org/10.1155/2015/571836

Hindawi

Research Article

Facile Synthesis, Characterization, and *In Vitro* Antimicrobial Screening of a New Series of 2,4,6-Trisubstituted-*s*-triazine Based Compounds

Ravi Bhushan Singh,[1] Nirupam Das,[2] and Md. Kamaruz Zaman[3]

[1]*Institute of Pharmacy, Harish Chandra PG College, Varanasi 221 002, India*
[2]*Department of Pharmaceutical Sciences, Assam University, Silchar 788 011, India*
[3]*Department of Pharmaceutical Sciences, Dibrugarh University, Dibrugarh 786 004, India*

Correspondence should be addressed to Md. Kamaruz Zaman; zamankamaruz.du@gmail.com

Received 15 June 2014; Accepted 9 January 2015

Academic Editor: Arie Zask

A series of new 2,4,6-trisubstituted-*s*-triazine was synthesized, assessed for antimicrobial activity, and characterized by FTIR, ^{1}HNMR, ^{13}CNMR, and elemental analysis. The tested compounds, **4d**, **4g**, **4h**, **4k**, and **4n**, have shown considerable *in vitro* antibacterial efficacy with reference to the standard drug ciprofloxacin (MIC 3.125 μgmL^{-1} against *B. subtilis*, *E. coli*, and *K. pneumoniae*). It was observed that compounds **4d** and **4h** displayed equipotent antibacterial efficacy against *B. subtilis* (MIC 3.125 μgmL^{-1}) and *S. aureus* (MIC 6.25 μgmL^{-1}). The studies demonstrated that the *para*-fluorophenylpiperazine substituted *s*-triazine (**4n**) was potent and exhibited broad spectrum antibacterial activity against *S. epidermidis*, *K. pneumoniae*, and *P. aeruginosa* with MIC of 6.25 μgmL^{-1} and for *E. coli*, it showed an MIC of 3.125 μgmL^{-1} equipotent with reference to the standard drug. Among all the compounds under investigation, compound **4g** also demonstrated significant antifungal activity (3.125 μgmL^{-1}) against *C. albicans*.

1. Introduction

Over the past decades, the development of new antibiotics has plummeted while antimicrobial resistance (AMR) has increased. Only a limited number of new antimicrobials have been developed in the last decade [1] and overtreatment with the available antibiotics has led to the emergence of AMR [2]. Despite big advances in antimicrobial therapies and strategies in counteracting infections, the emergence of AMR represents an emergency situation [3]. A high percentage of hospital-acquired infections are caused by highly resistant bacteria such as methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant enterococci [4]. Further, infections caused by resistant microorganisms often fail to respond to the conventional treatment, resulting in prolonged illness and higher death risk. Considering the scenario, the World Health Organization has necessitated an urgent and consolidated effort to avoid regressing to the preantibiotic era [5]. Therefore, discovery of novel antimicrobial molecules and their rational use are crucial to combat microbial infections. In recent years, triazine derivatives have gained particular interest on account of their broad biological activities.

Triazine based compounds are proven to possess potent anticancer [6], antiretroviral [7], antimalarial [8], and antitubercular activity [9]. Additionally, it has also been reported that certain *s*-triazine derivatives possess potent antimicrobial activity [10–12] and have been explored by researchers successfully to yield potent antimicrobial agents. For example, compounds having thiazole nucleus attached with this structural motif displayed promising antifungal activity [13]. Furthermore, we have reported certain *s*-triazine derivative substituted with diethylamino side chain and *para*-methoxyphenyl ring that have demonstrated broad spectrum antibacterial activity comparable to streptomycin [14]. It is noteworthy that several *s*-triazines coupled with piperazine have shown promising antimicrobial activity. In particular,