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Antipseudomonal activity of Artemisia quettensis essential oil and its synergy with imipenem

Elham saffari M.Sc , Mohammad Ali Nasiri Khalili,Ph D *, Jalil Fallah Mehr Abadi,Ph D

1. Faculty of Pharmaceutical science, Pharmaceutical Chemistry Branch, Islamic Azad University, Tehran, Iran, e-mail address:elham_saffari@yahoo.com
2. Department of Bioscience and Biotechnology Biology,malek Ashtar University of Technology, Tehran, Iran, e-mail address: manasiri@alumni.ut.ac.ir
3. Lister Microbiology laboratory of Tehran, Iran, e-mail address: jalil.fallah@gmail.com

Abstract

Subject: Pseudomonas aeruginosa is recognized as one of the major cause of infections in communities and hospitals. In this study,the chemical composition and antipseudomonal alactivity of Artemisia quettensis essential oil were evaluated, along with its synergistic activity with imipenem.

Research Method: The essential oil was obtained by hydrodistillation from aerial parts of the plant and analyzed using GC and GC-MS. Antibacterial activity of the oil was evaluated by agar dilution assay against clinical isolates of Pseudomonas aeruginosa. The essential oil exhibited synergism with imipenem and displayed the ability to enhance the activity of imipenem.

Summary: The main chemical composition of A.quettensis oil included Homoadamantane, camphor, eugenol. The oil and antibiotic showed high antibacterial activity against Pseudomonas aeruginosa with minimal inhibitory concentration (MIC) 0.5 µl/ml and 16 µg/ml, respectively. The synergistic action was evaluated. The essential oil exhibited synergism with imipenem and displayed the ability to enhance the activity of imipenem. the main purpose of this research is synergism effect, the oil and antibiotic showed MIC 0.2 µl/ml and antibiotics 4 µg/ml, respectively.

Aims: Artemisia quettensis tested showed good bactericidal effect because of the synergistic search by injecting a quarter of antibiotics inhibit the growth of bacteria and prevents the creation of the colony. The essential oils have antibacterial power of antibiotics to 4 fold increase.

Key words: Anti bacterial, Artemisia quettensis, essence, imipenem, pseudomonas aeruginosa, synergy

Introduction

Antibiotic resistance is a phenomenon as old as the advent of antibiotics [1]. The development and spread of resistance to currently available antibiotics is a global concern [2]. medicinal plants are important elements of traditional medicine in virtually all cultures. many investigators have demonstrated the antimicrobial activity of the constituents of some higher plants.

pseudomonas aeruginosa is recognized as one of the major cause of infections in communities and hospitals**.** The ability of this opportunistic human pathogen to acquire resistance to a broad range of antibiotics has made effective therapy more difficult [1-3]. imipenem is considered the last line of treatment against a variety of serious infections caused by P.aeruginosa.

imipenem resistant is very common in many areas of the world and it has continued to increase [4-5].

The use of natural products with therapeutic properties, whether mineral, vegetable and animal, for a long time were the main sources of important therapeutic agents as well as important raw materials for the manufacture of traditional and modern medicines [6]. Medicinal plants are considered an important source of new chemical substances with potential therapeutic effects [7]. They contain a wide range of substances that can be used to treat chronic diseases, and infectious diseases. Essential oils are a very interesting group of secondary metabolites that are potentially useful sources of antimicrobial compounds. Many studies have been published on the antimicrobial activity of essential oils [8–9].

The high level of antibiotic resistance in P. aeruginosa involves several mechanisms, including the overexpression of active efflux systems, the production of modifying enzymes, a decrease in outer membrane (OM) permeability and structural alterations of topoisomerases II and IV, involved in quinolone resistance [10]. Carbapenems such as meropenem and imipenem are potent broad-spectrum antimicrobial agents used to treat MDRPA[1] infections. These antibiotics bind to critical penicillinbinding proteins, thereby disrupting growth and structural integrity of the bacterial cell wall. However, the resistance of non-fermenting Gram-negative bacteria, including P. aeruginosa, to imipenem and meropenem is increasing [11].

The genus Artemisia, with the common Persian name of ‘dermaneh’, includes 34 species that are found wild all over Iran [12].

Material and methods

[1] Multidrug-resistant Pseudomonas aeruginosa