Anti-acetylcholinesterase, anti-α-glucosidase, anti-leishmanial and anti-fungal activities of chemical constituents of Beilschmiedia species

Abbas Mollataghi a, Emilie Coudiere b, A. Hamid A. Hadi a, Mat Ropi Mukhtar a, Khalijah Awang a, Marc Litaudon c, Athar Ata b,*

a Department of Chemistry, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia
b Department of Chemistry, The University of Winnipeg; Richardson College for the Environmental and Science Complex, 599 Portage Avenue, Winnipeg, MB, Canada R3B 2G3
c Centre de Recherche de Gif, Institut de Chimie des Substances Naturelles, CNRS, 1, Avenue de la Terrasse, 91198 Gif-sur-Yvette Cedex, France

ARTICLE INFO

Article history:
Received 2 August 2011
Accepted in revised form 4 November 2011
Available online 17 November 2011

Keywords:
Beilschmiedia alloiophylla
B. kunstleri
2-Hydroxy-9-methoxyaporphine
Anti-acetylcholinesterase activity
Anti-α-glucosidase activity
Anti-leishmanial activity

ABSTRACT

Phytochemical investigation of Beilschmiedia alloiophylla has resulted in the isolation of one new alkaloid, 2-hydroxy-9-methoxyaporphine (1), and ten known natural products, laurotetanine (2), liriodenine (3), boldine (4), secodeboline (5), isoboldine (6), asimilolbine (7), orewobeline (8), 6-epioreobeline (9), β-amyron (10), and (S)-3-methoxynordemsericine (11). Chemical studies on the bark of B. kunstleri afforded compounds 2 and 4 along with one bisbenzylisoquinoline alkaloid, N-dimethylphyllocryptine (12). Structures of compounds 1-12 were elucidated on the basis of spectroscopic methods. All of these isolates were evaluated for their anti-acetylcholinesterase (AChE), α-glucosidase, anti-leishmanial and anti-fungal activities. Compounds 1-12 exhibited strong to moderate bioactivities.

© 2011 Elsevier B.V. All rights reserved.

1. Introduction

The genus Beilschmiedia comprises nearly 250 species and is abundant in Africa and Asia. These plants produce several classes of natural products including, terpenoids, endiandric acid derivatives, essential oils, fatty acids, epoxyfuranoid lignans, flavonoids and alkaloids [1-4]. A few of these compounds are reported to exhibit anti-bacterial, anti-malarial and anti-tuberculosis activities [3-4]. In Africa, some of the plants of this genus are used as folk medicines in treating uterine tumors, rheumatism, and pulmonary diseases [5].

Enzymes carry out all of the required biochemical processes for life in the body. The dysfunction, overexpression, or hyperactivation of enzymes often leads to diseases [6]. An understanding of diseases at the molecular level has led to several enzyme inhibitors in clinical practices. For instance, galanthamine, a potent acetylcholinesterase (AChE) inhibitor, is used to treat Alzheimer’s disease (AD) [7]. Similarly, α-glucosidase inhibitors have applications in the treatment of type 2 diabetes and these compounds also have applications as anti-viral, anti-metastatic, immunomodulatory agents [8]. For anti-fungal assay, we screen compounds against Candida albicans, as compounds active against this fungus are considered to be active against other fungi [9]. With the rising cost of plant collections and preparation of crude extracts, it has become necessary for natural product chemists to expand screening targets [10]. Keeping this in view, we screened the crude methanolic extract of B. alloiophylla in anti-acetylcholinesterase (AChE), α-glucosidase, anti-leishmanial and anti-fungal assays. This extract was found to be active in all of these bioassays. Our detailed chemical investigation of the methanolic extract of B. alloiophylla yielded one new alkaloid, 2-hydroxy-9-methoxyaporphine (1), and ten known natural products, laurotetanine (2), liriodenine (3), boldine (4), secodeboline (5), isoboldine (6),...