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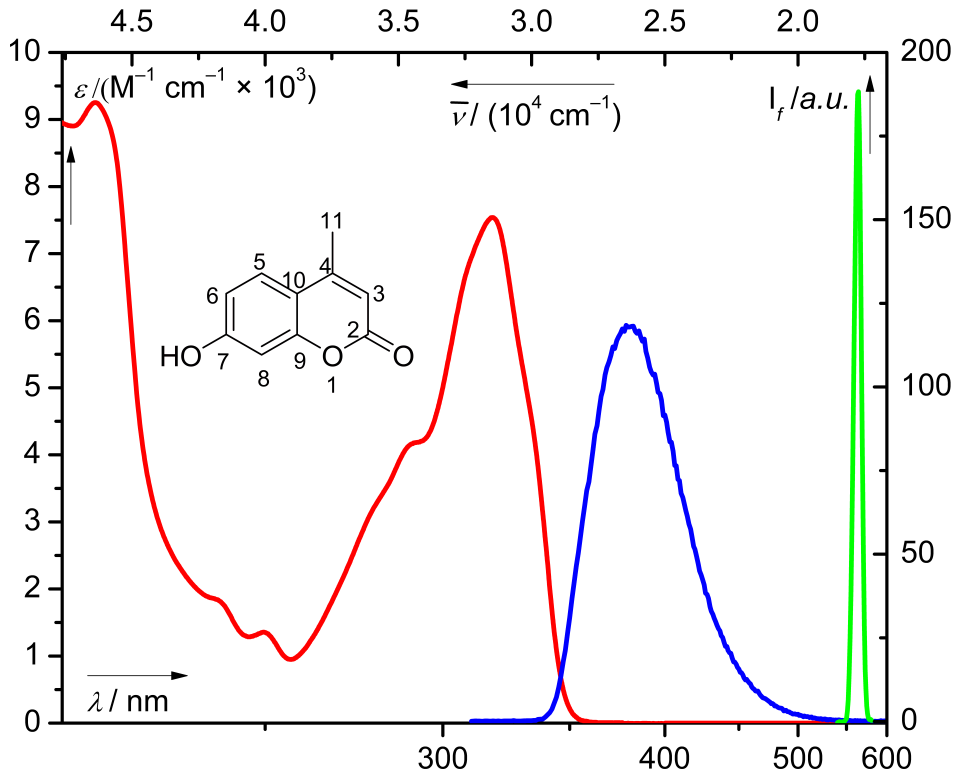

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Dr. D.K. Vardhan
Mumbai, INDIA

Correspondence Address:
Research Journal of Chemistry and Environment
Sector AG/80, Scheme No. 54, **Indore** 452 010 (M.P.) **INDIA**
Phone and Fax: +91-731-4004000

Website: https://worldresearchersassociations.com E-mail: info@worldresearchersassociations.com

CONTENTS

Antibacterial Activity of Prenylated Xanthones from Pericarp of *Garcinia mangostana* against Persistent Dental Infection Microorganism *Enterococcus faecalis*

Setiawan Arlette Suzy[1], Herawati Mieke[1], Dewi Warta[1] and Supratman Unang[2*]
1. Faculty of Dentristry, Universitas Padjadjaran, Jatinangor 45363, Sumedang, INDONESIA
2. Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, Jatinangor 45363, Sumedang, INDONESIA
*unang.supratman@unpad.ac.id

Abstract

As a part of ongoing research on antibacterial agents from botanical dietary supplements, Garcinia mangostana L. (commonly known as manggis in Indonesia) was selected for a detailed study. The dried and milled pericarp of G. mangostana was extracted by maceration with MeOH (3 × 5 L) at room temperature for 3 days. After filtration and evaporation of the solvent under reduced pressure, the combined crude methanolic extract (250 g) was suspended in H_2O (600 mL) to produce an aqueous solution, then partitioned in turn with n-hexane (3 × 500 mL), EtOAc (3 × 500 mL) and n-BuOH (3 × 500 mL) to afford dried n-hexane (32 g), EtOAc (40 g) and n-BuOH (60 g) extracts.

The EtOAc-soluble extract was found to have a significant antibacterial activity against Enterococcus faecalis ATCC 29212. Therefore, the EtOAc extract was selected for detailed purification. Repeated chromatography on silica gel of a EtOAc-soluble extract of pericarp led to isolation of four prenylated xanthones. The chemical structures of compounds 1-4 were identified as a-mangostin, b-mangostin, g-mangostin and garcinone-D on the basis of spectroscopic data and comparison to those related data previously reported.

The antibacterial activities of these compounds were evaluated against E. faecalis performed using broth micro dilution method. Among all compounds, compound 3 (g-mangostin) exhibit the most potent since it has a high inhibition diameter value in low concentration (10.93 d/mm in 100 mg/L).

Keywords: *Garcinia mangostana*, mangostin, antibacterial activity, *Enterococcus faecalis*.

Introduction

A successful pulp treatment depends on the technique and the status of radicular and coronal pulp tissues as well as on the type of medications used. In addition, infection control is an important factor that cannot be separated from successful primary dental pulp treatment.[1] Reducing or eliminating microorganism infection is the most important factor for this success through chemomechanic instrumentation process that can reduce most of the bacteria. However, microorganism retention in the dentin tubule usually causes permanent infection.[2]

The complexity of pulp chamber anatomy, as well as the microorganisms' ability to survive during starvation, leads to a situation where the microorganisms remain in the pulp chamber and root canal despite appropriate mechanical instrumentation and irrigation procedures.[3]

Therefore, pulp medications should be able to eliminate the residual microorganisms, neutralize the microorganism toxic products and prevent recurrent infection. The microorganism that is often isolated in the case of failed pulp treatment is *Enterococcus faecalis* anaerob facultative positive gram coccus. Although it is isolated in a small number in the primary tooth, this pathogen is able to proliferate in the root canal; therefore, it should be eliminated to recover and restore the tooth's normal function.[4] Pharmacological tests have shown that materials from nature are a source for potential bioactive compounds that may act as antibacterial agent. This antibacterial characteristic has led to a search for bioactive compounds that can be used as a primary tooth disinfection material especially against *E. faecalis*.[5]

Garcinia mangostana Linn. (mangosteen) belongs to Guttiferae family that has been used as in traditional medicine such as to cure skin infections, diarrhea, and chronic wound.[6] Mangosteen rind has been reported to contain a secondary metabolite that has a broad antibacterial biological activity including against *Enterococcus*.[7] Phytochemical study showed that the active component comes from the xanthone derivative group. Xanthone is a secondary metabolite that can be found in high-plants including mangosteen. Several studies show that xanthone extracted from mangosteen presents biological activities such as antioxidant, antitumor, anti-inflammation, antiallergic, antibacterial, antifungal, and antiviral activities.[8]

Although xanthone is already known as having a broad-spectrum of antibacterial activity, its use against *E. faecalis* has not been widely tested. The purpose of this study was to evaluate anti-bacterial activity of xanthone derivative compounds of mangosteen (*G. mangostana*) peel extract against *E. faecalis*.