GTRP
GAYATHRI TEKNOLOGICAL RESEARCH & PUBLICATION
Pteridological Research

Phytochemical and antibacterial activity of *Adiantum latifolium* Lam.

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Published: 15 June, 2012; Vol.1 (1):10-12;

Abstract
The phytochemical analysis of *Adiantum latifolium* leaves and their crude extract assessed for antibacterial activity against *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. The crude extract of *A. latifolium* leaves were analyzed by bioautographic method and phytochemicals analysed through thin layer chromatography (TLC) method. The results were indicated that the antibacterial zones of *A. latifolium* extract on TLC plate were positive to phenolic/flavonoid compounds. Therefore, this result suggested that *A. latifolium* possessed anti-bacterial activity and the extract would be a potential source for antibacterial agents.

Keywords: *Adiantum latifolium; Adiantum;* TLC; antibacterial activity

Introduction

Adiantum is belongs to the family Adiantaceae, and nearly 150 species found in all over the world (Thaweesakdi Boonkerd and Rossarin Pollawatn, 2011). Most of the *Adiantum* species were used for chest complaints, cough, expectorant, increase lactation, colds, aid kidney function, antiparasitic and dandruff. The fresh or dried leafy fronds of Adiantum species has antidandruff, antitussive, astringent, demulcent, depurative, emetic, weakly emmenagogue, emollient, weakly expectorant, febrifuge, galactogogue, laxative, pectoral, refrigerant, stimulant, sudorific, tonic and tea properties (Rajurkar and Kunda Gaikwad,2012).

Adiantum latifolium Lam. has been used in traditional medicine as anxiolytic and analgesic for many years (Nonato *et al*., 2011). The present study was to investigate the phytochemicals analysis and asses the antibacterial activity of *Adiantum latifolium* leaves.

Fig.1: Habitat of *Adiantum latifolium* Lam.

Materials and Methods

Phytochemical analysis

100g of dried powdered leaves of *A. latifolium* were extracted with ethanol in soxhlet apparatus for 3hr. The excess solvent in the extracts was evaporated in under reduced pressure and obtained a greenish gummy residue (crude extract) (2.64g). The extract was then kept in vials and stored in a desiccator at room temperature.

This article is PR direct Email Submission. Freely available on online through the PR open access www.gbtrp.com.

Received: January, 11, 2012
Accepted: February, 18, 2012

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Thin layer chromatography (TLC) phytochemical assay

The plant extract of *A. latifolium* was spotted onto a silica gel TLC plate (Kieselogel 60 F254 0.2 mm, Merck). The plates were developed in ascending direction with acetone: methanol (1:3) and $CHCl_3$: acetone: methanol: H2O (4:5:1:6) as mobile phase. Spots were visualized by UV irradiation at 366 nm after spraying with $AlCl_3$ reagent (Harbone, 1973; Wagner *et al*., 1984) for phenolic/flavonoid compounds, acidic iodine-potassium iodide for alkaloids, perchloric acid for sterols (Hara, 1963), Benedictus reagent for coumarins and flavonoids, vanillin-HCl reagent for proanthocyanidins (Ribereau-Gayon, 1972), and antimony (III) chloride reagent for cardiac glycoside (Wagner *et al*., 1984).

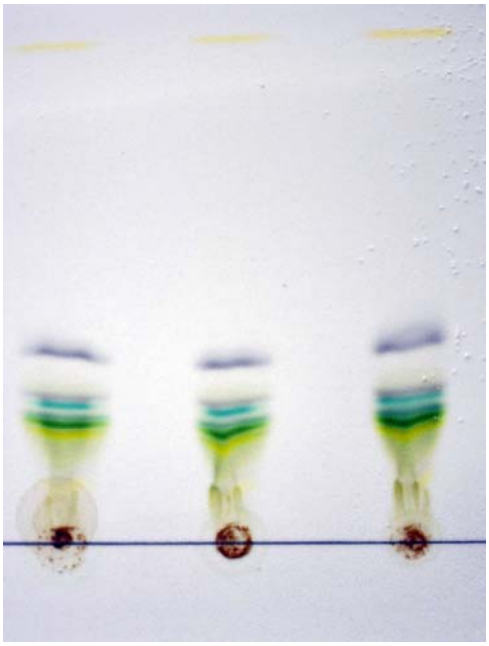

Fig.2: TLC identification of flavonoids compounds in *A. latifolium*

Bacterial strains

The bacterial strains of *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* for selected for the present study.

TLC bioautography assay

The bioautographic assay method (Zampini et al., 2005) was used to locate the alcohol compounds of antibacterial activity. The developed TLC plates were dried overnight in a sterile room. Then, the plates were covered with soft medium (Mueller-Hinton broth (MHB) with 0.8 % agar) containing 10^6 colony forming units (CFU) of selected bacterial strains, incubated at 27 ±1ºC for 24 hr, and sprayed with a 2 mg/ml iodonitro tetrazolium chloride solution. Plates were incubated at 27±1ºC for 1h in darkness for color development. Growth inhibition areas on pink background were compared with the retension factor (Rf) of the related spots on the TLC plates of phytochemical study.

Results and Discussion

The antibacterial activity of *A. latifolium* leaves extract to human pathogens were investigated and analyzed. The observed results revealed that *A. latifolium* leaves had active compounds against *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. Earlier studies reported that acetone extracts from leaves of *A.capillus* - v*eneris* showed antibacterial activities against *S. aureus* and *Pseudomonas aeruginosa* (Victor *et al*., 2003). The results showed that the antibacterial components of *A. latifolium* extract were tested positive to phenolic/flavonoid compounds (Rf = 0.46; 0.52; 0.76; 0.84; and 0.92) shown in Fig.2. Therefore, it is recommended that *A. latifolium* has antibacterial good activity against the tested bacteria, so, it could be used as safer antibacterial agents in future.

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