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PERSIAN COMMON CRAPE MYRTLE LEAVES; PHYTOCHEMICAL SCREENINGS AND FLAVONOID PATTERNS

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ABSTRACT

Extracts of *Lagerstroemia indica* leaves from Lythraceae family were assessed for phytochemical screening tests and flavonoid profiling. The results revealed the plant contained flavonoids, tannins and cardiac glycosides. The isolation of flavonoids was carried out by means of preparative Thin Layer Chromatography of methanolic extract of the plant leaves. The structure of two flavonoids was determined by the UV-Vis. techniques in methanol and by addition of the shift reagents. They may belonging to the flavanones/dihydroflavonols and chalcones flavonoid groups.

Key words: *Lagerstroemia indica*, Lythraceae, Phytochemical screening, Flavonoid.

INTRODUCTION

The *Lagerstroemia* genus or crape myrtle, which belongs to the *Lythraceae* family, Myrtales order containing more than 50 species[1]. It is originally endemic to southeast Asia, Indian subcontinent and northern parts of Australia. *Lagerstroemia* name was authored by Carl Linnaeus in honor of Magnus von Lagerstroem, a Swedish naturalist[2-4]. The most important medicinal species of this genus is *L. speciosa* L. or banaba tree. Banaba has a wide and long history in traditional and folk medicine[1-6]. Its leaves have been used as a traditional remedy for prevention and treatment of diabetes mellitus and kidney diseases in the Philippines and some other countries of southeast Asia. The anti-diabetic activities of banaba extract have been attributed to polyphenolics and corosolic acid contents. As well as its hypoglycemic effects, these natural active constituents are proved to have antihyperlipidemic, antioxidant, anti-inflammatory, antifungal, antiviral, antineoplastic and osteoblastic activities[4-8].

One of the most famous species of the plant is *L. indica* L. or common crape myrtle that frequently grown as an ornamental, decorative and attractive shrub in the world[2,3,7,8]. This shrub is used as a versatile landscaping plant in Iran under the common Persian name of "Gol-e Touri"[9]. It flowers early in the summer[2]. The leaves, flowers and bark of *L. indica* are used as laxative and diuretic. In addition the plant has been used traditionally for treating asthma and hemostasis and as a detoxifier. The phytochemical composition and pharmacological and biological evaluations on *L. indica* have been the subject of a few studies[7,8,10,11].

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According to the best of our knowledge, no phytochemical investigations on this species have been reported in Iran, therefore the present research was planned to study the phytochemical screenings on the leaves constituents and its flavonoid patterns.

EXPERIMENTAL

Plant materials

The fresh leaves of *L. indica* were collected during the flowering period of the plant from cultivated shrubs in Tehran, Iran in June 2010. The species was identified in the biology department of Science and Research Branch, Tehran Islamic Azad University, Tehran, Iran by Dr. Iraj Mehregan. A voucher specimen of the plant (Number: 2658) was deposited at the herbarium department of Isfahan School of Pharmacy, Iran.

Phytochemical screening of extracts

Microchemical and qualitative tests are to be performed for establishing profile of the *L. indica* leaves extracts with various chemical reagents for its nature of various chemical phytoconstituents. The phytochemical experimental tests were achieved to detect the presence of alkaloids, cardiac glycosides, anthraquinones, saponins, essential oils, tannins and flavonoids in the Persian common crape myrtle leaves[12,13].

TLC Fingerprinting for flavonoid patterns

The methanolic extract of the plant leaves was then analyzed by thin layer chromatography (TLC). The analysis was carried out on aluminum Silica gel 60 F_{254} coated plates, layer thickness: 250 μm (Merck, Darmstadt, Germany) and developed in the different five systems including:

(i) Ethyl acetate-Formic acid-Acetic acid-Purified water (100-11-11-26)

(ii) Ethyl acetate-Formic acid-Glacial acetic acid-Ethyl methyl ketone-Water (50-7-3-30-10)

(iii) Chloroform-Ethyl acetate (60-40)

(iv) Chloroform (100)

(v) Toluene-dioxan-glacial acetic acid (90-25-4)

All of the TLC solvents were of analytical grade and Merck brand. Chloroform-Ethyl acetate (60-40) showed the highest and best resolution and revealed the presence of five principal flavonoid compounds. The bands were visualized under UV light (254 and 365 nm) and the identified flavonoids are presented in the results section[14,15].

Preparative TLC and using of shift reagents

By using of TLC preparative techniques on Silica gel 60 and Chloroform-Ethyl acetate (60-40) solvent, two spots were obtained in needed amounts and subjected to the UV-Visible spectrophotometric analysis with flavonoid ionizing and complexing shift reagents including NaOMe, NaOAc, NaOAc/H_3BO_3, $AlCl_3$ and $AlCl_3$/HCl[15,16].

RESULTS AND DISCUSSION

Results in Table 1 showed the plant leaves contain flavonoids, tannins and cardiac glycosides. The flavonoids and tannins were present in high quantity.

Table 1: Phytochemical screenings *L. indica* leaves extracts

Phytochemical constituents	Reagents and tests	Results obtained
Alkaloids	a. Mayer's reagent	_
	b. Iodine reagent	_
Cardiac glycosides	Kedd's reagent	++
Anthraquinones	Borntrager's Test	_
Saponins	Foam test	_
Flavonoids	Wilson's boric acid test	++++
Tannins	Ferric chloride test	++++
Essential oils	Clevenger apparatus	_

Thin layer chromatography of the methanolic extract of *L. indica* was studied and different R_f values of the spots were determined. There were identified five main flavonoid spots that R_f values were 0.36, 0.61, 0.70, 0.79 and 0.85, respectively with yellow orange, green, pale green, dark green and brown colors. The spots with R_f equal to 0.36 and 0.79 were separated from preparative TLC plates. Their UV-Visible data with different shift reagents were:

(i) R_f = 0.36; UV (λ_{max} nm) MeOH: 290, 310 (shoulder), NaOMe/MeOH: 285, 320, $AlCl_3$/MeOH: no change, $AlCl_3$/HCl/MeOH: 280, 310, NaOAc/MeOH: 280, 305, NaOAc/H_3BO_3/MeOH: no change.

(ii) R_f = 0.79; UV (λ_{max} nm) MeOH: 237, 285 (sh), 378, 387 (sh), 498, NaOMe/MeOH: 237, 285 (sh), 378, 387, 498, $AlCl_3$/MeOH: 236, 285 (sh), 395, 420 (sh), $AlCl_3$/HCl/MeOH: 237, 290 (sh), 397, 420, 523, NaOAc/MeOH: 227, 285 (sh), 379, 389, 498, NaOAc/H_3BO_3/MeOH: 227, 285 (sh), 379, 389, 498.

Analyzing of the UV-Visible spectra data and their hypsochromic and bathochromic shifts, proved that the R_f spots with 0.36 and 0.79 may belonging to the flavanones/dihydroflavonols and chalcones flavonoid groups, respectively. A part of reported results are in the line of previously works on *Lagerstroemia* species[6,7].

CONCLUSION

Due to the anti-diabetic properties of some *Lagerstroemia* species, we were keen to evaluate other species of this genus for finding of similar potent compounds. *L. indica* is one of the widespread species of this plant that currently no usage in the Iranian folk medicine. In this respect, pharmacognostical and chemical studies on the plant are substantial steps which could serve in the identification of its compounds. It further requires more advanced studies to evaluate chemical, pharmaceutical and pharmacological researches to establish the drug standardization.

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