ReviewArticle [Punasiya *et al.*, 5(6): June, 2014:3617-3621]
CODEN (USA): IJPLCP ISSN: 0976-7126

INTERNATIONAL JOURNAL OF PHARMACY & LIFE SCIENCES
(Int. J. of Pharm. Life Sci.)

Pharmacognostic and Pharmacological overview on *Hibiscus syriacus L.*

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Abstract

Hibiscus syriacus Linn. (Family: Malvaceae), commonly known as Rose-of-Sharon. It has wide range of medicinal and pharmacological application. It is used in tradition system of medicine and exibits diuretic, expectorant, stomachic, ophthalmic, antipyretic, anti-Inflammatory activity, antioxidant, demulcent, emollient, febrifuge, haemostatic and antifungal agent. It is manly used in ayurvedic preparation. This paper provides an overview on pharmacological, phytochemical properties and therapeutic benefits of the plant.

Key-Words: Antioxidant, Antibacterial, Antifungal, Flavonoids

Introduction

Hibiscus syriacus Linn. (Family: Malvaceae), commonly known as Rose-of-Sharon. Rose-of-Sharon is valued for large flowers produced in summer when few other shrubs bloom. It is useful as a garden accent due to its strict, upright habit. The open, loose branches and light green leaves make Rose-of-Sharon ideally suited to formal or informal plantings, and with a little pruning makes an attractive, small specimen tree. The plant grows in sun or partial shade and in any soil. Rose-of-Sharon grows 8 to 10 feet tall and spreads 4 to 10 feet. The growth rate ranges from slow to moderate and transplanting is easy. Several roots are usually located just beneath the soil surface. The single or double flowers are in shades of red, pink, white and purple, depending on the cultivar. Individual flowers stay open for one day and close at night. Since plants bloom on new growth, shaping or pruning can be done at any time.

However, pruning is usually not required since the plant grows slowly and keeps a tight upright form. Prune in late winter or early spring in northern climates. Frequent severe pruning gives fewer but larger flowers; no or little pruning gives many smaller flowers. Although tolerant of poor soils and drought in sun or light shade, this upright, deciduous shrub requires ample moisture to flower its best and to avoid leaf drop.

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Some protection from mid-day or afternoon sun is beneficial for optimum plant appearance. Tolerance to aerosol salt and wet soils combined with drought tolerance make this a fine plant for many landscapes.[1]

Hibiscus syriacus L. (lamily Malvaceae), a perennial deciduous shrub, includes numerous cultivars having pink, purple, bluish white flowers and is appreciated as an ornamental. *H. syriacus* is the herddiest spacies in its genus [2,3,]

Traditional uses

Epidemiological evidence suggests an inverse relationship between dietary intake of flavonoids and the risk of coronary heart disease. It has been suggested that oxidative modification of LDL plays an important role in the development of human atherosclerosis. Thus, protecting LDL from oxidation by such compounds as flavonoids may be an effective strategy to delay or prevent the progression of the disease. The leaves are diuretic, expectorant and stomachic. A decoction of the flowers is diuretic, ophthalmic and stomachic. It is also used in the treatment of itch and other skin diseases. Report provided reliable information about its antitussive activity. (4) *Hibiscus syriacus* L. is widely distributed all around the world as ornamental and green plants. Furthermore, it is also a medicinal plant used as antipyretic, antihelminthic Anti-Inflammatory Activity, Cholesterol-lowering Effects/serum cholesterol levels, Prevent Heart Attacks, Mild laxative, Urinary tract problems, Cleansing and detoxification Skin and vascular health and antifungal agent in the orient. There have been some reports on the active constituents of its stem and

root bark. However, there are few investigations into the antioxidant activity of the pigment from its petals.[5]

A decoction of the flowers is diuretic, ophthalmic and stomachic. It is also used in the treatment of itch and other skin diseases, dizziness and bloody stools accompanied by much gas. The bark contains several medically active constituents, including mucilage, carotenoids, sesquiterpenes and anthocyanidins. A decoction of the root bark is demulcent, emollient, febrifuge, haemostatic and vermifuge. It is used in the treatment of diarrhoea, dysentery, abdominal pain, leucorrhoea, dysmenorrhoea and dermaphytosis.[6]

Geographical sources

The genus hibiscus widely distributed over Korea, china, India, and Siberia. The dried roots of hibiscus syriacus are used as a fork medicine in the orient.[7]

Chemical constituents

The methanolic formic acid extraction of the petals of *Hibiscus* syriacus yielded 3-0-malonylglucosides of delphinidin, cyanidin, petunidin, pelargonidin, peonidin and malvidin. The structures were determined by hydrolytic studies and 1 H NMR and FABMS examination.[8]

A new cyclic peptide, hibispeptin A, has been isolated from the mot bark of *Hibiscus* syr/acus and the stucturee was a designed a cyclo [-Ahablm (-pyro431u)-Pm-Lee-Phe-] on the basis of various specific analyses.[9]

A new cyclic peptide, designated as hibispeptin B, has been isolated from the mot bark of *Hibiscus s.vrlacus.* Hibispeptin B has a unique amino acid unit aasisned as 2-amino-3.(2 hydroxy-5-aminoacctylbenzyl)pentanoic acid (Ahabpa) in cyclic core. Its structure was established as *cycio[-* Ahabpa(-pym-Glu)-Pro-Leu-Leu-] on the basis of various spectroscopic analyses. Configurations of all normal amino acids were determined chiral-TLC analysis.[10]

Pharmacological activity

Antifungal Activity

The root of *Hibiscus syriacus* (Malvaceae) has been used for treatment of fungal diseases such as tinea pedis (athlete's foot). In this study, they investigated the antifungal constituent of the root of *Hibiscus syriacus* Ggoma, which was produced by a mutation breeding using gamma ray irradiation, and compared the antifungal activity of *H. syriacus* Ggoma and its parent type. According to the results, the methanolic extract of *H. syriacus* Ggoma exhibited four times higher antifungal activity than its parent type against *Trichophyton mentagrophytes*. Antifungal agents have been used for treatment of fungal infections. The root bark of *Hibiscus syriacus* (Malvaceae), which is widely distributed over East Asia, has been used as an antifungal agent for treatment of athlete's foot.

Previous studies of the chemical constituents of the root of *H. syriacus* have reported on hibispeptins A and B, triterpene caffeates, and syriacusins A-C as antioxidants; however, no studies on antifungal substances have been reported. Recently, a new *H. syriacus* mutant, designated as *H. syriacus* Ggoma, was produced by a mutation breeding using gamma ray irradiation and has been grown as an ornamental plant for approximately four years. This study has been conducted for comparison of the antifungal activity of the root extracts of *H. syriacus* Ggoma and its parent type, and an antifungal constituent from the root of *H. syriacus* has been isolated by repeated column chromatography and identified by extensive use of spectroscopic methods.[11]

Antibacterial Activity

Bioassays for antimicrobial activities were carried out using leaves of *Hibiscus syriacus* plants. Petrolium ether, Dichloro-methane, Isopropyl alcohol extracts from leaves of *Hibiscus syriacus* was prepared and tested against gram positive bacteria i.e. Bacillus cereus (MTCC 430), Staphylococcus aureus (MTCC 3160)gram negative bacteria Escherichia coli (MTCC433) and Klebsilla pneumoniae (MTCC432). Both the Petrolium ether and Isopropyl alcohol extracts showed considerable activity against all the test organisms. The Dichloro-methane extracts of Hibiscus syriacus which showed no activity against all the bacteria. The Minimum Inhibitory Concentration (MIC) of the plant extracts ranged from 0.01 mg/ml to 100 mg/ml. The antibacterial activities of both the Petroleum ether and Isopropyl alcohol plant extracts were comparable to those of selected chemical antibiotics suggesting their potential as alternatives to the antibiotics in the treatment of infections caused by this microorganisms.[12]

Antioxidant Activity

Hibiscus syriacus L. (Malvaceae) well known drug in the system of Ayurveda system of Medicine. In the present study, antioxidant activity of Methanolic extract (ME) and its chromatographic methanolic fraction (CMF) of leaves of *H. syriacus* was evaluated in several *in vitro* and *ex vivo* models. Further, preliminary phytochemical analysis and TLC fingerprint profile of the extract was established to characterize the extract which showed antioxidant properties. The *in vitro* and *ex vivo* antioxidant potential of leaves of *H. syriacus* was evaluated in different systems viz. Hydrogen donating activity by DPPH reduction, superoxide radical scavenging

activity in NBT system, reducing power and inhibition of lipid peroxidation induced by TBARS in liver homogenate. The CMF was found to have different levels of antioxidant properties in the models tested. In scavenging DPPH and superoxide radicals, its activity was intense (EC50 = 248.00 and 105.00 µg/ml respectively) while in reducing ability by ferric radical, it was 15 mg/ml comparable to ascorbic acid was moderate. It also inhibited lipid peroxidation of liver homogenate (EC50 = 291.6100 µg/ml). The free radical scavenging property may be one of the mechanisms by which this drug is effective in several free radical mediated disease conditions.[4]

The macroporous resin adsorption method was used to purify the pigment from *Hibiscus syriacus* L. petals. Through the comparison of the adsorption and desorption rates of six types of macroporous resins including AB-8, S-8, NKA-9, DM-130, D101 and 860021 to the pigment, 860021 resin was selected as the most appropriate resin to purify the pigment. The antioxidant capacities of the pigment extract (PE) were evaluated through *in vitro* experiments using hydroxyl radical scavenging assay, 1,1- diphenyl-2-picrylhydrazyl (DPPH) scavenging assay and lipid peroxidantion (LPO) inhibition capacity assay induced by Fe2+-H2O2. Total flavonoid content (TFC) of PE was determined using the colorimetric methodology and total phenolic content (TPC) using Folin–Ciocalteu reagent. PE produced significant antioxidant activity. In addition, PE demonstrated higher TFC and TPC of 63.4±1.8 mg rutin equivalents/g and 172.6±2.4 mg gallic acid equivalents/g, respectively. This study suggests that *H. syriacus* L. petal can be used potentially as a source of natural antioxidants.[5]

The antioxidant properties of heat-treated *Hibiscus syriacus* was investigated using DPPH test. The stems and the roots of *Hibiscus syriacus* were examined, respectively. As a result, the extracts of heat-treated *Hibiscus syriacus* at 100 ºC for 24 hr were more effective than those of non-treated *Hibiscus syriacus* in reducing the stable free radical 1,1-Dipheny, 1-2-picrylhydrazyl (DPPH).[7]

Phytochemistry

The floral anthocyanins of *Hibiscus syriacus* L. (Malvaceae) showed the occurrence of *3-0-* glucosides of delphinidin, petunidin, cyanidin and malvidin. During the systematic survey of anthocyanins in the species of genus *Hibiscus*, they have however found that *H. syriucus* contains unidentified anthocyanin pigments which are extremely labile in methanolic HCl. Successive large-scale extraction using methanol-formic acid has now resulted in the isolation of six anthocyanidin 3-0-malonylglucosides, among which three were found to be new. We report here the isolation and characterization of this compounds.[8]

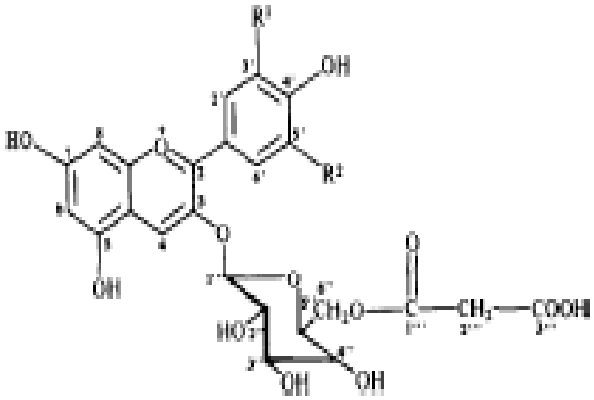

Fig. 1: Structure of Anthocyanidin malonylglucosides

Many cyclic peptides with unique structures and biological activities have been isolated from microbial and marine origins. But only a few compounds including lyciumins l, citrusins 2, curcacycline A 3, cleromyrine I 4, yunnanins 5, astins 6, segetalins 7 and dichotomiuss were isolated from higher plants. Some of them have abnormal amino acids in their structures. We here in deal with a peptide with unusual amino acid unit in cyclic.

In the course of screening for biologically active novel constituents from higher plants using as the traditional Chinese medicines , we have isolated a unique cyclic peptide, named hibispeptin A from the root bark of *Hibiscus syriacus* Linne (Malcaceae), which has been used as antipyretic, antheimintic and antifungal agents in the Orient. Previously some flavonoids, polyphenols and fatty acids have been isolated from H. syriacus. In this paper, they describe the isolation and structural elucidation of hbispeptin A. A methanolic extract of the dried root bark (1.6 kg) of Syriacus was washed with hexane and then partitioned between $CHC1_3$ and H_20. The $CHCl_3$-soluble fraction was chromatographed on silica gel and Sephadex LH-20 columns followed by preparative RP-TLC developed with 65% aq. MeOH to give hibispeptin A (18 mg).[9]

The dried root bark of *H. syriacus* (1.6 kg) was ground into powder and extracted with McOH twice at room temperature for 2 days. The methanolic extract was filtered and the filtrate was concentrated *in vacuo. The* residue was partitioned between n-hexane and water and then water layer was extracted with chloroform, successively.

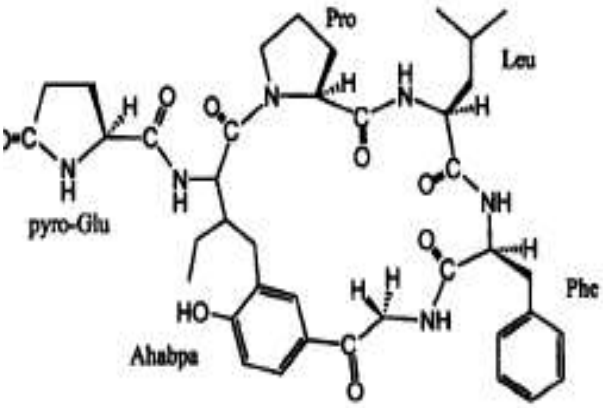

Fig. 2: Structure of Hibispeptin A.

The chloroform layer was concentrated under reduced pressure and the residue was chromatographed on a silica gel column eluted with chloroform only and chloroform methanol (100:1 to 1:1, stepwisely) mixture. The peptidic fractions were collected and combined by monitoring with reaction to ninhydrin reagent for hydrolysate (6N HCI, 110"C, 24 hours) in combination with analytical TLC analysis. The fraction was concentrated *in vacuo* and rechromatograpbed on a silica gel column eluted with chloroform-acetone (1:1), followed by Sephadex LH-20 column chromatography eluted with $CHCI_3$-MeOH (1:1). The peptidic fraction was finally purified by reverse-phase (ODS) preparative TLC developed with 65% aq. methanol to give hibispeptin B (6.0 mg). *Hibispeptin B* - White powder; laid = -42.7 ° (C = 0.75, CHCI3/MeOH (1:1)); IR (KBr) : 3420, 2925, 1690, 1675-1640, 1600, 1540, 1440, 1285, 1115 cm-1; UV ~.max nm (8) in MeOH : 209 (37500), 221 (sh, 24400), 272 (23300), 325 (9800), 360 (9000); FAB-MS : *ra/z* 697 (M+H)+; High resolution FAB-MS : *m/z* 697.3940 (M+H) +, *m/z* 719.3740 (M+Na) + (C3d-I52NtOs requires 697.3924 and 719.3745, respectively); IH-NMR and 13C-NMR[10]

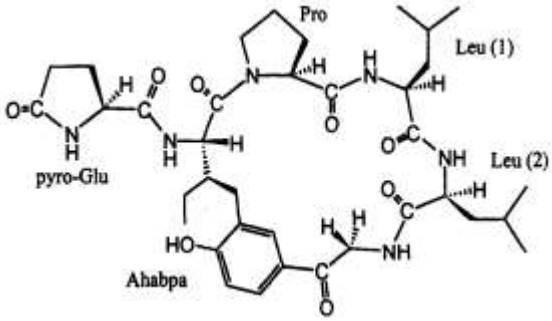

Fig. 3: Structure of Hibispeptin B.

Conclusion

The herbal is a vital part of the development of modern civilization. The litureture review showed that *H. syriacus* has been traditionally in the tretment of various disease conditions. It has contaits glycosides, flavonoids, saponin, steroids, sterols and alkaloids compouns in various part of the plant. Further pharmacological and phytochemical exploration is requied for the systematic investigation of the plant *Hibiscus syriacus.*

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How to cite this article
Punasiya R., Devre K. and Pillai S. (2014). Pharmacognostic and Pharmacological overview on *Hibiscus syriacus L.*. *Int. J. Pharm. Life Sci.*, 5(6):3617-3621.
Source of Support: Nil; Conflict of Interest: None declared

Received: 03.05.14; Revised: 17.05.14; Accepted:08.06.14