



Therapeutic Uses of Hibiscus -A Review Article

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ABSTRACT

Herbal medicine is an ancient form of medicine that has been used by humans for thousands of years. The vital systems of primordial medicines include Ayurveda, Siddha, Unani, and folk medicine and, the most developed and widely practiced medicinal system in India is Ayurveda. Hibiscus species are commonly shrubs, herbs or trees with many useful properties, of which *H. syriacus* is one of the prime species of the genus. It is endowed as the national flower of South Korea, commonly known as 'Rose of Sharon' and is found along valleys, open slopes, roadsides and sea cliffs. The plant species is used as a medicine in many diseases such as amoebic colitis, hemorrhoids, hemorrhoidal bleeding, migraine, headache, cold, cough, nausea, vomiting, abdominal pain, ascariasis, colitis, diarrhea, dysentery, dyspepsia, gas, stomach ache, hematochezia, ascariasis etc. Several biological activities of the plant are attributed to the presence of various active compounds like botulin, coumarins, fumaric acid, hydroquinone, is vitexin, linoleic acid, nonanoic acid, naringenin acid, Para hydroxybenzaldehyde, palmitic acid, Syracusans A-C, triterpenoids and vanillic acid. Some phytochemicals, including linolenic acid, palmitic acid, hydroxyhibiscone A, hibiscuses D, Syracusans A, pentacyclic triterpene esters, triterpenoid, nonanoic acid, anthocyanins, and others, are responsible for its biological importance like anti-cancer, anti-aging, anti-depressant, anti-fungal, anti-melanogenic, anti-oxidant, cytoprotective, neuroprotective, etc., Detailed information extracted by reviewing the medicinal utilities & Phyto-pharmacological properties, provide elaborated evidences for the application of *H. syriacus* in many ailments.

Keywords: Hibiscus, Pharmacology, Medicinal Uses.

I. Introduction

The Unani system of medicine founded by Hippocrates in 460-377 BC is based on the concept of balancing of four bodyhumours. Any changes in these humours like quantity, quality, Viscosity, colour and smell leads to diseases except in internal injury cases, whereas restoration of the balance leads to health. The system involves 4 natures-cold, hot, wet and dry and 4 humours-blood or sanguineous humour (hot & wet), phlegm(cold & wet), yellow bile or cholera (hot & dry) and black bile or melancholia (cold & dry) [3]. The Unani system of medicine emphasizes on diagnosing a disease through Nabz (pulse), Baul (urine), Baraz (stool), etc. Besides, it gives due importance to the surroundings and the ecological conditions on the state of health of humans. The six essential prerequisites (called Asbab-e-Sitta Zarooriya) for the prevention of diseases in the Unani system are air, food and drinks, bodily movement and response, psychic movement and response, sleep and wakefulness, and excretion and retention [4]. The Unani system strives to find out the best possible ways by which a person can lead a healthy life with least sickness. In these diseases, it can be treated by Pharmacotherapy (Ilaj-bid-dawa) in which drugs of animal, mineral or plant origin are used in crude form, either as a single drug or in compound form [5]. The Arabs were instrumental in introducing Unani medicine in India around 1350 AD. The first known Hakim (Physician) was Zia Mohd Masood Rasheed Zangi. Some of the renowned physicians who were instrumental in development of the system are- Akbar Mohd Akbar Arzani (around 1721 AD) the author of the books- Qarabadin Qadri and Tibbe Akbar; Hakim M. Shareef Khan (1725-1807)- a renowned physician well known for his book Ilaj ul Amraz. Hakim Ajmal Khan (1864-1927) a great name among the 20th Century Unani physicians in India. He was a multifaceted personality besides being a physician he was a scientist, politician and a freedom fighter.



Fig. 1 Verities of Hibiscus in India

He was instrumental in the establishment of Unani and Ayurvedic College at Karol Bagh, Delhi. He was a keen researcher and has supervised many studies on Rauwolfia serpentina- the source plant for many well-known alkaloids like reserpine, Ajmaloon etc. Another great contributor is Hakim Kabiruddin (1894-1976); he has translated 88 Unani books of Arabic and Persian languages into Urdu. The first institution of Unani medicine was established in 1872 as Oriental College at Lahore in the undivided India. Thereafter many institutions came into existence [2, 4, 6]. Though the system was originated in Greece and developed in Arab countries like Egypt, Syria, Iraq, Persia etc., now it is wide spread in all over the globe and became as a part of Indian Traditional systems of Medicine. At present Unani system of medicine, with its own recognized practitioners, hospitals, educational and research institutions, forms as an integral part of the national health care system. Today India is growing as a world leader in Unani medicine. The government is also constantly increasing its support to develop, to validate its classical claims and to popularize the Unani system of medicine in India to provide best reliable natural, safety and efficacious health care to its public. The World Health Organization (WHO) has recognized the Unani System of Medicine as an alternative system to cater the health care needs of human population [2]. At present there are more than 30 colleges offering degree course in Unani medicine and the approximate number of physician turn out is around 20,000. There are around 177 hospitals. A National Institute of Unani Medicine has been established at Bangalore in Karnataka state in 1983 in collaboration with the Govt. of Karnataka- for catering to both academic and R & D requirements. Central Council for Research in Unani Medicine is the premier agency involved in R & D activities [6]

In the modern world, as people become more aware of the strength and side effects of synthetic pharmaceuticals, there is an increasing interest in natural product cures. Throughout history, herbal-based medicines have been used to treat a variety of infectious illnesses, and several scientific investigations have underlined the importance and contribution of various plant species. Ayurvedic as well as, natural herbs had been used since ancient times by all the civilizations in history. Herbal remedies have shown modest growth in recent decades [1]. According to the World Health Organization, traditional medicines are used by more than 80% of the world's population for primary healthcare [2]. Hibiscus has around 250 species that are extensively dispersed throughout the world's tropical and subtropical climates, with approximately 40 species found in India. Many species are grown for their decorative value. *H. syriacus* is an important species in the genus, which have great economic and medicinal value and is also used in beverages, in Asian countries [3]. It is used against many diseases such as amoebic colitis, ascariasis, abdominal pain, cold, cough, colitis, dermatophytes, diarrhoea, dysentery, dyspepsia, gas, haemorrhoids, haematochezia, haemorrhoidal bleeding, headache, itchiness, migraine, nausea, psoriasis, painful skin diseases, stomach ache, scabies, ulcers, vomiting, vertigo etc. It also contains numerous secondary metabolites which have anti-inflammatory, anti-bacterial, anti-fertility, anti-fungal, anti-oxidative, anti-hypertensive and hypoglycemic like biological activities [4].

Currently, the anti-proliferative effect of root bark against cancer cells has recently been discovered, and various tri-terpenoids have been identified as active chemicals responsible for the activity [5]. Although, several research works have been already performed previously, but a comprehensive review is still lacking which may

aid in future research. The current study has been attempted to summarise the most recent knowledge on pharmacological actions, ethnomedicinal and phytochemical properties of *H. syriacus*, which in-turn will be valuable for future implications. The study will deliver detailed authentication for the application of the plant in various maladies.

II. Traditional Uses of Hibiscus

In India, Hibiscus flowers and leaves are used for the abortion, antifertility, contraceptive, Diuretic, Menorrhagia, Bronchitis, Emmenagogue, Demulcent, and Cough. In Africa and neighbouring tropical countries has lengthy history, Hibiscus flowers have been used in sachets and perfumes. In areas of Northern Nigeria, Hibiscus has been used to treat constipation. The fleshy red calyx is used in the preparation of jam, jellies and cold and warm teas and drinks. The leaves have been used like spinach. The leaves are used in traditional medicines as emollients and aperients to treat burning sensations, skin disease, and constipation. In Egypt, the plant used for the treatment of cardiac and nerve diseases and has been described as diuretic. In Japan, Hibiscus leaves are used as antidiarrheal. Iran, sour tea used for the treatment of hypertension. In western countries, Hibiscus flowers often are found as component of herbal tea mixture. In Thailand, people consume Roselle juice to quench thirst.

III. Morphological description of Hibiscus

It is a shrub or small tree, 4 m tall. Stems erect or ascending, sparsely to moderately hairy when young, becoming globous or nearly so with age. Leaves stipulate, petiole densely hairy adaxially. Inflorescence has solitary flowers or few-flowered clusters in the axil of distal leaves. Flowers horizontal or ascending, sometimes double, pedicel 1.5 cm long, minutely, densely, stellate-hairy, epicalyx bracts 7 or 8, 0.9-2.2 cm long, linear or narrowly oblanceolate, margin not ciliate, densely stellate-hairy throughout, calyx lobed, widely campanulate, 1.6-2 cm long, lobes triangular, apices sharp or short-acuminate, minutely and thickly stellate-hairy throughout, corolla broadly funnel shape, staminal column 2.5-3.5 cm long, white, carrying filaments virtually throughout, free section of filaments not secund, generally 1.5-3 mm long, style 8 mm long, white, branches sometimes of unequal lengths, stigma white. Fruits capsules, 1.5-2.5 cm long, greenish tan, ovoid, apex apiculate, minutely, densely stellate-hairy. Seeds 5-8 per locule, 4-5 mm long, reniform-ovoid, laterally flattened, reddish brown, laterally globous, dorsally long, hairy, hair straight, reddish orange in colour [6,7].

IV. Pharmacological activities of Hibiscus.

A. Anti-nociceptive and Anti-inflammatory Activity

The anti-nociceptive and anti-inflammatory activities of methanolic extract of *Hibiscus rosa-sinensis* leaves at dose of 250 and 500 mg/kg body weight were studied. Result showed a significant dose dependent anti-inflammatory activity in carrageenin and dextran induced rat paw edema, animal model. In the same study, the significant dose dependent peripheral analgesic activity was also studied using acetic acid induced writhing response and tail flick method at same dose. The analgesic activity of aqueous and alcoholic extract of Hibiscus

rosa-sinensis leaves were studied⁸. Result showed that plant leaves have significant analgesic activity at dose of 100, 200 mg/kg body weight.

B. Anti-convulsant Activity

Different extract of Hibiscus rosa-sinensis flower was evaluated for anticonvulsant activity at a dose of 250 mg/kg body weight. It showed significant anticonvulsant activity in maximum electroshock seizure method but did not show any significant activity in Isoniazid induced model. The result was analyzed by studying the various phases of convulsion viz. flexion, extensor, clonus, stupor, recovery and death.

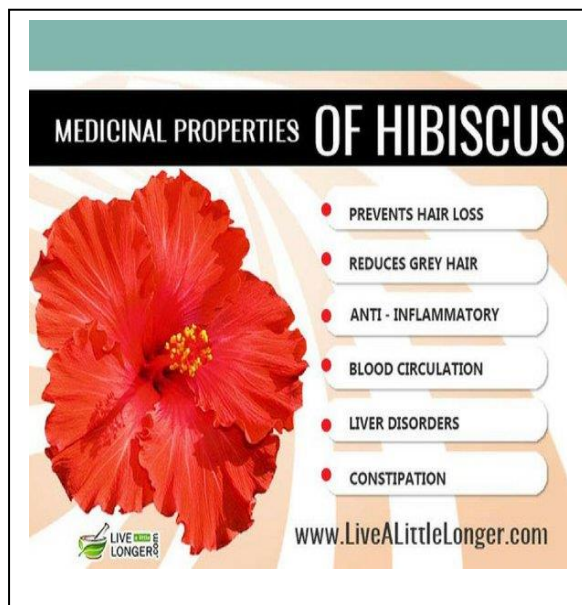


Fig. 2 Medicinal Properties of Hibiscus



Fig. 3 Benefits of Hibiscus Tea

C. Anti-ulcer Activity

Various extract of Hibiscus rosa-sinensis root were prepared by cold maceration method and evaluated for antiulcer activity. The result revealed that aqueous extract of Hibiscus rosa-sinensis at dose of 500 mg/kg showed highly significant dose dependent antiulcer activity in pylorus ligation induced gastric ulcer model. The gastroprotective activity was also performed on the various extract of flower. The result showed significant reduction in ulcer index and ulcer score.

D. Anti-diabetic Activity

The anti-diabetic activity of ethanolic extract of Hibiscus rosa-sinensis leaves at dose of 100 and 200 mg/kg body weight was reported. Result showed that plant has significant hypoglycemic activity in non obese diabetic (NOD) mice. In this study, various parameters such as blood glycosylated haemoglobin level, Plasma insulin, Blood triglycerides, cholesterol, and blood urea were evaluated. Aqueous and ethanolic extract of Hibiscus rosa-sinensis flower at 250 mg/kg body weight was evaluated for antidiabetic activity. Result revealed that aqueous extract did not alter the glucose level in normoglycemic as well as in STZ induced diabetic but

ethanolic extract of *Hibiscus rosa-sinensis* flower at doses of 250 and 500 mg/kg showed significant reduction in blood glucose level in both acute and sub-acute treatment. The insulin secreting activity of *Hibiscus rosa-sinensis* leaf extract in Alloxan induced diabetic rat. Result demonstrated that treatment of leaf aqueous extract was enhanced the serum insulin level and had a therapeutic efficacy in recovering type- I diabetes in Wistar rats.



Fig. 4 Hibiscus for Cardiac and Cholesterol Diseases and Weight Loss



Fig. 5 Hibiscus for Hair conditioner and Cosmetics

E. Anti-pyretic Activity

Ethanolic extract of two varieties of *Hibiscus rosa-sinensis* flower, Lahina and China were evaluated for antipyretic activity. The result showed that flower extract of China rose have significant antipyretic activity at dose of 300 mg/kg on Brewer's yeast induced pyrexia model.

F. Wound Healing Activity

The wound healing activity of ethanolic extract of *Hibiscus rosa-sinensis* flower at dose of 120 mg/kg/day was evaluated. The result showed significant reduction in wound area. The study was performed by using excision, incision, and dead space wound model and activity was assessed by the rate of wound contraction, period of epithelization, tensile strength, granulation tissue weight and hydroxyproline content.

G. Hair growth Activity

The hair growth activity of petroleum ether extract of leaves and flower of *Hibiscus rosa-sinensis* was evaluated by in-vitro and in-vivo methods. Result revealed that leaf extract exhibit more potency on hair growth than flower extract. The same activity on 2.0 % Ethanolic extract of *Hibiscus rosa-sinensis* flower was evaluated. The result showed that extract has potential hair growth activity in female Wistar rats.

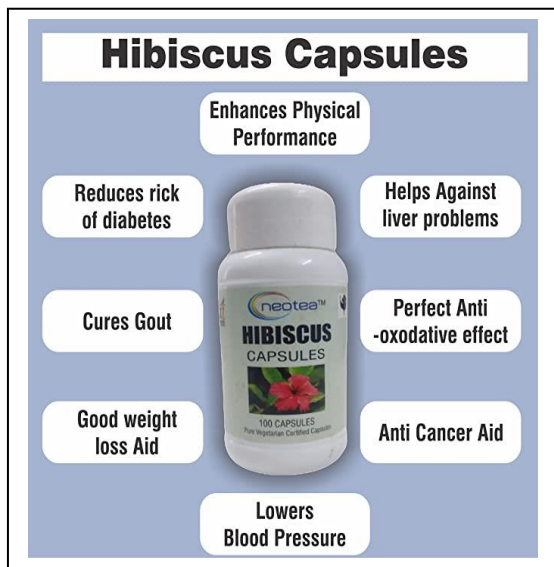


Fig. 6 Hibiscus capsules for various Diseases

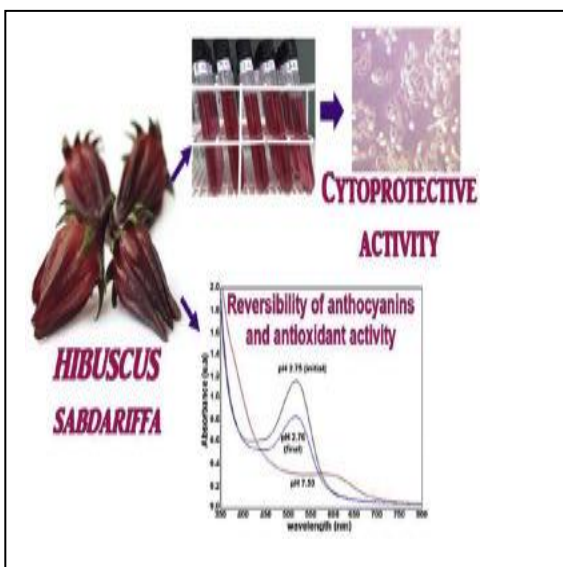


Fig. 7 Hibiscus against Anti- Cancer activities

H. Anti-bacterial Activity

Different extract of leaves and flower of *Hibiscus rosa-sinensis* was evaluated for its activity against Gram positive and Gram negative bacteria by agar well diffusion and agar disk diffusion methods. Result revealed that plant have highly positive antibacterial activity against some pathogens.

I. Anti-fertility Activity

Ethanollic extract of *Hibiscus rosa-sinensis* root was evaluated for antifertility activity by and result showed its potential post-coital Antifertility, estrogenic and anti-implantation activity at dose of 400 mg/kg body weight.

J. Anti-cancer Activity

The anticancer activity of *Hibiscus rosa-sinensis* extract was evaluated at dose of 3.5 and 7.0 mg/kg body weight and studied showed protective effect in the tumour promotion stage of cancer development against the single topical application of benzoyl peroxide (20 mg/0.2ml/animal) followed by UV radiation (0.420J/m²/s). The role of gentisic acid in the chemopreventive activity of *Hibiscus rosa sinensis* extract on 7, 12-dimethyl benz(a)anthracene (DMBA)/croton oil-mediated carcinogenesis in mouse skin via 12-O-tetradecanoyl phorbol-13-acetate (TPA)-induced tumour promotion response and oxidative stress. The result revealed that extract and gentisic acid has a role in the modulating activity of *Hibiscus rosa-sinensis* that reduced the MDA formation and H₂O₂ content.

K. Immuno-modulatory Activity

The immune modulatory activity of hydro-alcoholic extract of *Hibiscus rosa-sinensis* flower was studied and observation showed significant immune stimulatory activity at 75, 150, 300 mg/kg in carbon clearance method, haem-agglutination antibody titre method and footpad swelling method.

L. Anti-estrous Activity

Benzene extract of *Hibiscus rosa-sinensis* flower was evaluated for anti-estrous activity on estrous cycle and reproductive organs in female albino mice. The result revealed that flower extract disrupt the estrous cycle and reduce the weight of ovaries, uterus and pituitary gland.

M. Aphrodisiac Activity

The aqueous and alcoholic extract of *Hibiscus rosa-sinensis* leaves was evaluated for its aphrodisiac activity in immature albino male rats. The gain in body weight and isolated sexual organs compared to control group confirmed its anabolic property.

N. Antifungal activity

According to previous studies, the methanol extracts prepared from the leaves of the *Hibiscus rosa-sinensis* were shown to have antimicrobial activities against *Candida albicans*, *Aspergillus niger*, *Candida parapsilosis* and *Trichophyton rubrum*. Using well diffusion method and after an incubation period of 24 hours at 37° C, the maximum observed zone of inhibition was 9.3 ± 0.57 mm and it was against *Aspergillus niger* followed by 6.6 ± 0.57 mm against *Candida albicans* at 80 µg/ml concentration of leaves methanolic extract. These fungi were obtained from infected skins, and the chemical compounds responsible for the antifungal activity may be due to flavonoids, tannins, terpenoids, saponins, or alkaloids identified in the study.

O. Cardio-protective Effect

The cardio-protective activity of *Hibiscus rosa-sinensis* flower was studied and observation showed cardio-protective effect at concentration of 125, 250 and 500 mg/kg in isoproterenol induced myocardial injury and study also founded that it also augments endogenous antioxidant molecules.

P. Hepato-protective Activity

The hepato-protective potential of anthocyanin extract from the petals of *Hibiscus rosa-sinensis* against carbon tetrachloride-induced acute liver damage in Wistar rats. Result revealed that pre-treatment with the anthocyanin fraction reduced the levels of these markers and hence, the degree of liver damage.

Q. Hypo-lipidemic Activity

The hypo-lipidemic activity of *Hibiscus rosa-sinensis* root extract (500mg/kg) was studied against triton and cholesterol-rich high fat diet-induced hyperlipidemia in rats. Guggulipid (200mg/kg) was taken as standard drug. Result of histopathological findings in rat liver supported the protective role of *Hibiscus rosa-sinensis* root extract in both the models.

R. Effect on CNS

The effect of methanolic extract of *Hibiscus rosa-sinensis* leaves on sedative, anxiolytic, depressant and skeletal muscle relaxant was studied. Result showed that methanolic extract have sedative, anxiolytic, CNS-depressant and skeletal muscle relaxant effects.

S. Anti-hypertension Activity

The effect of anthocyanidin fraction (100 and 300mg/kg) of *Hibiscus rosa-sinensis* on blood pressure in Deoxycorticosterone Acetate (DOCA)-salt hypertensive rats was studied. Blood pressure was measured by both non-invasive and invasive technique. The result was revealed that anthocyanidin fraction of *Hibiscus rosa-sinensis* have anti-hypertensive as well as antioxidant activity.

Conclusion

Majority of the population pursue the drugs derived from the plant origin for their health care. Several medicinal plants derived components are used directly or indirectly for the therapeutic applications. The antioxidant properties of the *Hibiscus rosa sinensis* plants are particular interest in view of the oxidative modification. The diabetes related complications like hyperglycemia, hypercholesteromia, hyperlipidemia also controlled by the *Hibiscus rosa sinensis* plants in animals. The *Hibiscus rosa sinensis* plant has been identified for their various therapeutic applications but the more research is needed for the future prospective. With time, we can expect to see a greater body of scientific evidence supporting the benefits of *Hibiscus rosa sinensis* in the overall maintenance of health and protection from disease. All of its parts have been used in the treatment of fever, inflammation, bacterial infections, and even as contraceptive agent. Flavonoids, tannins, terpenoids, saponins, and alkaloids are the main phytochemicals as they are present in different extracts, and are more likely responsible for their biological activities. Lower toxicity of this plant can be an advantage to qualify it to be used as new therapeutic agent. In some areas, the research is very limited and therefore further studies must be carried out to explore the phytochemicals mechanism of action such as anti-cancer activity. However, these biological compounds must be first isolated and identified successfully. Moreover, clinical trials on the toxicity of this plant and its pharmacological effects must be carried out to assess its safe application and desirable side effects.

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