

CHEMICAL CONSTITUENTS & PHARMACOLOGICAL EFFECTS OF HIBISCUS ROSA- SINENSIS (CHINA ROSE) – A REVIEW

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ABSTRACT

Plant have been a source of medicinal compounds since ancient times and have been used to treat various diseases in human as well as animals. *Hibiscus rosa-sinensis* is member of the family Malvaceae, grow as green herbaceous plant in tropical regions. It is a tropical shrub, with large, glossy green leaves and spectacular trumpet shaped flowers. This plant has various important medicinal uses for treating wounds, inflammation, fever and cough, diabetes, infections caused by bacteria and fungi, hair loss, gastric ulcers in several tropical countries. Various research studies proved that the different parts of *Hibiscus rosa-sinensis* plant possess Antioxidant, Antimicrobial, Antidiabetic, Antiulcer, Hepatoprotective, Antifertility, Antigenotoxic and

Antiinflammatory properties which helps in treatment of many diseases. The phytochemical analysis showed that *Hibiscus rosa- sinensis* contained tannins, anthraquinones, quinines, phenols, flavanoids, alkaloids, terpenoids, saponins, cardiac glycosides, protein, free amino acids, carbohydrates, reducing sugars, mucilage, essential oil and steroids. The current review will discuss the chemical constituents, pharmacological effects of *Hibiscus rosa-sinensis*.

KEYWORDS: *Hibiscus rosa-sinensis*, Chemical constituents, phytochemical compounds.

INTRODUCTION

In history, the medicinal plants are widely used for the various purposes. The plant have Identified as medicinal plants because of the ability to synthesize chemical compounds which play major role to prevent different disease like cancer, diabetes, etc.^[1] (Khristi, 2016). According to D. Pearline, N. Kamat, *Hibiscusv rosa sinensis* belongs to the family Malvaceae. It is a species of tropical *Hibiscus* in the *Hibisceae* tribes. It is considered native

to East Asia. Although the plant is not related to the true roses, the term ‘*Rosa sinensis*’ literally means ‘*rose of China*’ in latin. It was first named by *Carolus Linnaeus*. It is abundant in the sub-tropical and tropical and tropical regions and is cultivated extensively as an ornamental plant.^[2] (Pearline, 2015). O. S. Falade conducted their study and reveals that, *Hibiscus rosa sinensis*, Linn. [Malvaceae] parts has been reported as potential herbal tea. The flower has also been reported to possess diverse biological activities. For example, it is used for the treatment of cough, fever, dysentery, venereal diseases and cancerous swellings.^[3] (Falade, 2009). According to another studies, this plants belongs to the subkingdom Magnoliophyta and to the class Magnoliopsida, meaning that it is a vascular plant that produces seeds. It belongs to the family Malvaceae, and it is one of the 300 species of the genus *Hibiscus*^[4] (Ayu, 2018). Traditionally, *Hibiscus* flowers has been reported to possess antitumor properties, as well as used as analgesic, antipyretic, anti-asthmaic, and anti-inflammatory agents^[5] (Vastrad, 2018). The aqueous- ethanolic extract of aerial parts of *H. rosa sinensis* were reported for its used in constipation and diarrhea. In addition young leaves of *H. rosa sinensis* are sometimes used as a spinach substitute^[6] (Essiett, 2014).



Figure 1: *Hibiscus rosa sinensis* [China rose].

Distribution – According to different studies, the probably origin of the plant was tropical Asia, It was cultivated in China, Japan and the Pacific islands for an equal long time, it was originated in South China^[7] (A. Snafi). The plant with deep- red flowers is believed to have an asian origin. thus this plant is denoted by the name *rosa sinensis*.^[7]

Vernacular Names - Hindi - Jasum, Gulhar. **English**-Chinese hibiscus, Shoe flower, China rose. **Sanskrit** - Japa. **Rajasthani** - Gudhal. **Malayalam** - Bunga Raya. **Tamil** - Sembaruthi.

Taxonomical classification

Table 1.

Kingdom	Plantae
Subkingdom	Tracheobionta
Super Division	Magnoliophyta
division	Magnoliophyta
Class	Magnoliopsida
Subclass	Dilleniidae
Order	Malvales
Family	Malvaceae
Genus	Hibiscus
Species	Rosa-sinensis

Botanical description:– According to S. Verma, *Hibiscus rosa-sinensis* is an evergreen woody, glabrous, showy shrub 5-8 feet in height. Leaves are bright green, short petiolated, ovate or lanceolate, more or less acuminate; irregularly and coarsely serrated towards the top, entire near base, glabrous on both sides, a few minute stellate hairs on the nerves beneath stipules, lanceolate subulate and glabrous. Pedicels are axillary, solitary, and longer than the leaves and joined above the middle. Flowers are large, solitary, axillary, bisexual, bell shaped with 5 petals, with red pistil and stamens in orange colour projecting from centre. The flowers are generally red in the original varieties but generally lack any scent. Also many colors are available in a single, double or multi-shades including white, yellow, orange, red, pink, purple, etc.^[9] (S.Verma, 2016).

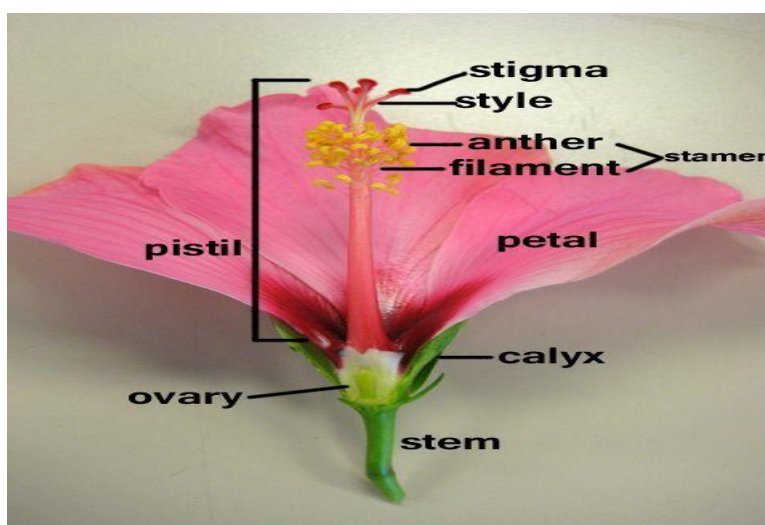


Figure 2: Parts of flower.

Traditional uses- According to Chopra and I. C. Verma, In India, Hibiscus flower and leaves are used for the abortion, antifertility, contraceptive, Menorrhagia, Bronchitis, Emmenagogue, Demulcent, Cough^[10] (Jadhav, 2009). Flower were used for regulation of menstrual cycle, for liver disorders, high blood pressure as antitussive, in stomach pain, for eye problems and also use for cure headache^[11] (Chopra, 1969).

Hibiscus extract have been used for again in Ayurveda to cure many ailments. They are used to cure ailments such as hair loss and hair graying. These are ground into a fine paste with water and this is generally used as a shampoo plus conditioner. The plant also helps to improve the overall texture and health of hair. *Hibiscus* is a sweet sour herb and is used in the preparation of herbal teas. It acts as an antioxidant and also help in the reduction of cholesterol levels.



Figure 3: Hibiscus tea.



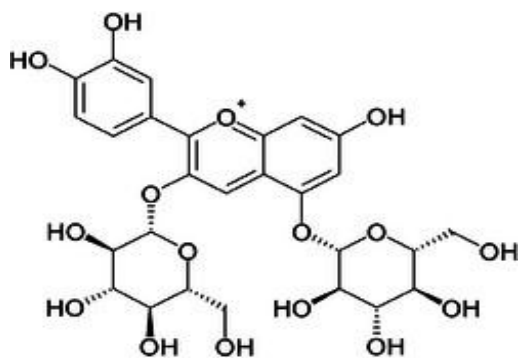
Figure 4: Hibiscus flower hair oil.

Table 2: Shows that traditional uses of hibiscus rosa-sinensis.

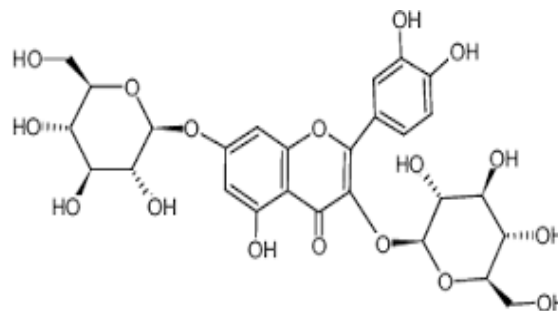
Sr. No.	Place	Parts	Activity
01	Bangladesh	Decoction of flower	Regulation of menstrual cycle ^[12]
02	China	Hot water extract of flower & bark	Emmenagogue ^[13,14]
03	Cook Island	Hot water extract of flower and bark	Alling infants, Gonorrhoea ^[15]
04	East Indies	Hot water extract of flower Leaf Juice + <i>Vernonia Cinera</i>	1 Regulation menstrulation produce abortion ^[16] To stimulate expulsion of after birth.
05	Fiji	Leaf extract	digestion, Diarrhea ^[17]
06	Ghana	Peeled Twig	Chewstrick ^[18,19]

07	Guam	Leaves	To promote draining of Abscesses ^[20]
08	Haiti	Decoction of flower & leaves	Flu & cough, stomach pain, Eye Problems ^[21]
09	Hawaii	Flowers	Lactation ^[22]
10	India	Hot water extract of stem & flowers	Antifertility ^[23] Contraceptive ^[24] Diuretic ^[25] Bronchitis ^[26] Cough ^[27] Abortifacient ^[28]
11	Japan	Decoction of leaves	Antidiarrheal ^[28]
12	Kuwait	Flowers	Aphrodisiac ^[29]
13	Malaysia	Hot water extract of roots & flowers	Expectorant ^[31] Emmenagogue ^[32]
14	Mexico	Infusion of Bark & leaves	Dysentery ^[33]
15	Nepal	Hot water extract of roots	Cough ^[34]
16	New Britain	Hot extract of flowers	Menstruation ^[35]
17	Northern Ireland	Water extract of flower	To induce labor ^[36]
18	Peru	Hot water extract of Flower	Contraceptive, Emmenagogue ^[37]
19	Philippines	Hot water extract of flowers	Bronchial Catarrh ^[38] Emmenagogue ^[39]
20	Trinidad	Decoction of flowers	Amenorrhea ^[40]

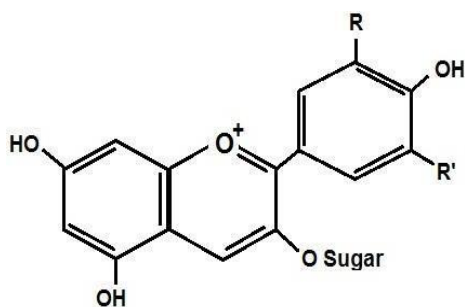
Chemical constituents:– *Hibiscus rosa sinensis* is well studied plant. The report suggested that it contains Tannins, Flavonoids, Steroids, Alkaloids, Saponins, Total phenols, Total proanthocyanidin, Total flavonoids. It has been also reported that it contains majorly cyanidin-3,5-diglucoside, cyanidin-3-sophoroside-5-glucoside, Anthocyanins and flavonoids, quercetin-3,7-diglucoside, quercetin-3-diglucoside. The other compounds are also present like cyaniding chloride, quercetin, hentriacontane, cyclopeptide alkaloid and vitamins: ascorbic acid and thiamine. The roots of *H.sinensis* contains sterols, carbohydrates and glycosides, phenolic compounds and tannins, triterpenoids, saponins, mucilage and flavonoids. The *Hibiscus* flowers contain cyaniding diglucoside, flavonoids and vitamins, thiamine, riboflavin, niacin and scorbic acid. *H. rosa sinensis* extract is a source of many potentially active antioxidants and anticancer constituents such as quercetin, glycosides, riboflavin, niacin, carotene, malvalic acid gentisic acid, margaric acid and lauric acid^[41] (Sugumaran, 2012).



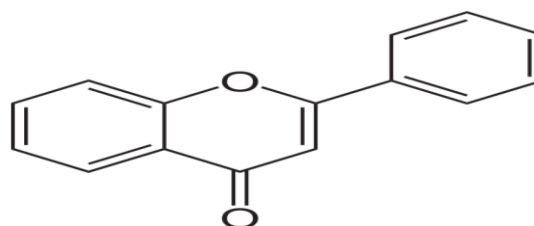
Cyanidin 3,5-diglucoside



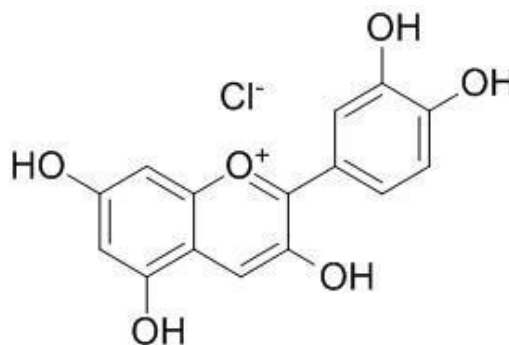
Quercetin-3,7-diglucoside



Anthocyanin



Flavonoids



Cyaniding chloride

Pharmacological effects:– According to another studies, It is found that leaves and flowers of *Hibiscus rosa sinensis* have a wide range of pharmacological benefits. The aqueous – ethanolic extract of its aerial parts has been reported for its use in constipation and diarrhea. It is a blood purifier and also helps in treatment of cystitis, that is, inflammation of the bladder^[42] (Kamar, 2012).

Antimicrobial effect:- The antibacterial activity of the extracts of *Hibiscus rosa- sinensis* flowers and leaves was studied against some clinical bacterial isolates. The extracts of *Hibiscus rosa-sinensis* flower showed strong antibacterial activity than that of leaves. The maximum zone of inhibition (29mm) was observed against *S. aureus*, followed by *P. vulgaris*

(25mm), *P. aeruginosa* (24mm) and *Citrobacter sp.* (24mm) and the lowest against *S. typhimurium* (13mm) at the highest amount of flower extracts (100mg/well). All the test bacteria responded to the extracts in a dose-dependent manner. However, *K. pneumonia* was found to be resistant to the flower extracts at the applied doses (50 and 100 mg/well)^[42] (Uddin 2010).

The antibacterial properties of hibiscus rosa-sinensis flower extract was investigated against four Gram-positive (*Bacillus subtilis*, *Staphylococcus aureus* and *Listeria monocytogenes*) and four Gram-negative bacteria (*Escherichia coli*, *Salmonella typhimurium* *Salmonella enteritidis* and *Klebsiella pneumonia*). Aqueous extract of hibiscus inhibited the growth of *Salmonella typhimurium* (diameter of zone of growth inhibition: 11.5 and 9.0 mm at concentration of 100 and 50 mg/ml respectively). While ethanolic extracts inhibited the growth of *Staphylococcus aureus* (diameter of zone of growth inhibition: 14.0 12.0 mm at concentration of 100 and 50mg/ml respectively)^[44] (Y.Mak 2013).

Antioxidant effect:- According to various studies conducted and reveals that DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging activity was observed using 80% methanol flower extract as $75.46 \pm 4.67\%$ and 80% ethanol flower extract as $64.98 \pm 2.11\%$, compared to $77.54 \pm 4.77\%$ for BHT as a positive control. The scavenging of DPPH free radicals was measured at 515 nm using a UV visible spectrophotometer.

Moreover, the total phenolic contents of the methanolic and ethanolic extracts were 61.45 ± 3.23 and 59.31 ± 4.31 mg/100g dry extract, and total flavonoid contents were 53.28 ± 1.93 and 32.25 ± 1.21 mg/100g dry extract respectively. Because it was observed that methanolic extract had higher amount of phenolics and flavonoids as well as contributed to higher scavenging activity than ethanolic extract, this strongly suggest that they are responsible for the anti-oxidant activity^[45] (Z. Khan 2013).

The crude 90% methanolic extract of the leaves of *Hibiscus rosa-sinensis* possessed strong concentration dependent antioxidant activity. The methanolic extract of *Hibiscus rosa-sinensis* leaves also showed high ferric reducing antioxidant power^[46] (M.Divya 2013).

The antioxidant and Antigenotoxic effects of ethanol extract of *Hibiscus rosa-sinensis* (HRS) flower was studied by evolution of the potential of the extract to scavenging the free radicals and inhibiting lipid peroxidation in vitro. The ethanol extract showed a dose dependents

increase in radical scavenging ability against various free radicals and also exhibited a significant inhibition of lipid peroxidation in vitro^[47] (N. Khatib 2009).

Anti-inflammatory:– Gossypin (1), isolated from *Hibiscus vitifolius* L. flowers, showed significant anti-inflammatory activity at a dose of 200 mg/kg body weight against carrageenan induced rat paw edema and increased vascular permeability induced by various phlogistic agents. It also inhibited significantly the accumulation of the pouch fluid and granulation tissue formation in carrageenan-induced granuloma pouch in rats, which could be attributed to decreased formation of collagen tissue. Leukocyte migration and formation of pleural exudates were also reduced by gossypin (1) in carrageenan and turpentine-induced pleurisy in rats; the efficiency was lower than phenylbutazone, but it possesses a greater margin of safety^[48] (Parmar, 1978).

Antipyretic effects:– The antipyretic effects of 250mg/kg *H. rosa sinensis* aqueous root extract was investigated using yeast-induced pyrexia in albino Swiss rats. After 3 hours and a half, the extract reduced the rectal temperature from $39.0 \pm$ to $37.5 \pm 0.25^\circ\text{C}$, where as treatment with 30mg/kg b.w paracetamol as positive control maintained it as 37°C ^[49] (Soni, 2011).

Antidiabetic effect - It have been mentioned in different studies that *Hibiscus rosa- sinensis* having antidiabetic compounds. An experiment conduct on diabetic mice reveals that, In non-obese type 1 diabetic mice, the alcoholic leaves extracts of *Hibiscus rosa sinensis* was proven to be an oral hypoglycemic agent. It reduced blood glucose level from 281.6 ± 3.7 mg/dl to 92.2 ± 2.63 and 83.8 ± 3.15 mg/dl using the concentration 100 and 200mg/kg of body weight respectively, compared to $103.37 \pm$ mg/dl in insulin injected NOD mice, which was used as positive control^[50] (Moqbel, 2011). The tested extracts also reduced levels of triglycerides, blood urea, glycosylated hemoglobin, and cholesterol significantly after 5 weeks of oral administration^[51] (Kumar, 2013).

Cardiovascular effect:– The cardioprotective effects of dried pulverized flower of *Hibiscus rosa-sinensis* on isoproterenol induced myocardial injury was studied in rats^[52] (Kate, 2010). The effect of the aqueous leaves extract (200 mg/kg) of *Hibiscus rosa-sinensis* was investigated on the renal function of hypertensive rats. Although *Hibiscus rosa-sinensis* leaves extract reduced blood pressure, but it induced significant ($P < 0.05$) increase in the Na^+ level of normotensive rats, thus it may interfere with the normal function of the kidney and

hence increased salt retention^[53] (Gauthaman, 2006).

CONCLUSION

Majority of the population pursue the drugs derived from plant origin for their health care. *Hibiscus rosa sinensis*, which belongs to Malvaceae family, has been widely used as a traditional remedial plant in China and several tropical countries.

The current review discussed the chemical constituents and pharmacological effect of *Hibiscus rosa-sinensis*.

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