



Review on Hibiscus rosa Sinensis Phytochemistry and Medicinal Uses

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Abstract

Hibiscus rosa sinensis is known as china rose belongs to family *Malvaceae* family. This plant has various important uses for treating wounds, inflammation, fever, and cough, diabetes, infections caused by bacteria, fungi, hair loss, and gastric ulcers in several tropical countries. Phytochemical analysis documented that the main bioactive compounds responsible for its medicinal effects are namely flavonoids, tannin, terpenoids, saponins and alkaloids. Experiment from recent study showed that various pharmacological activities such as anti-pyretic, analgesic, anti-inflammatory, anxiety study, anti-depressant. This plant is most effective in ayurveda. Therefore, further research must be conducted to isolate the phytochemicals and explore their specific Mechanism of action. This review summarizes the Phytochemistry, Pharmacology, and medicinal uses of flower with the purpose of investigating its therapeutic potential through clinical trials.

Keywords

Hibiscus rosa sinensis , Medicinal uses, Phytochemicals, Pharmacological effects.

Introduction

China rose or “Queen of tropics” is often a popular name for the gorgeous flowering plant *Hibiscus rosa-sinensis* , as it is mainly found in south-east China and some islands in the Pacific and Indian Ocean. *Hibiscus* is one of Hawaii’s admired national plants, and it is often seen worn in hair for cultural occasions. This plant 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* . In addition, the juice extracted from the leaves and flowers has been used since a long time ago as a natural remedy for some diseases and painful symptoms, as well as in herbal cosmetics as wilted . Dark flowers’ extract is used to make eyeliners, and in shoe-blackening . It was believed that the species was given the name “*rosa sinensis*” which means “Rose of China” in Latin, by the famous Swedish biologist, Carolus Linnaeus in the early 1750s.

Traditionally, *Hibiscus* flowers have been reported to possess antitumor properties, as well as have been used as analgesic, antipyretic, anti-asthmatic, and anti-inflammatory agents. Several studies have proved the presence of anti-oxidant, anti-fungal, and antimicrobial properties in flowers of *Hibiscus rosa-sinensis*. Research on extracts of stems, roots, leaves, and flowers from *Hibiscus* have revealed that its phytochemical components contributed to beneficial findings to human’s health such as antioxidant activity, which is the removal of free radicals that can lead to DNA damage. Other examples of antioxidant sources from plants would include *Senna bicapsularis* L. flower extracts, which is simply known as *Cassia*. The flowers were also

Current scientific literature suggests that more than 50% of today’s clinical medications were of natural product origin. Many of them have played a significant role in the pharmaceutical industry and in developing better therapies for various diseases. This plant is economically very essential owing to the herbal products and medicinal uses. Because of insufficient current pharmacological information, there is not much scientific research or clinical trials conducted on the chemical extracts

of *Hibiscus rosa-sinensis* that could be crucial in exploring its fast potential medicinal applications.

Scientific Classification

Hibiscus Rosa Sinensis (Family :- Malvacea)



Fig 1

Kingdom:- Plantae
 Division:- Magnoliophyta
 Class:- Magnoliopsida
 Order:- Malvales
 Family:- Malvaceae
 Genus:- *Hibiscus L.*
 Species:- *rosa*

Phytochemisrty

Each part of *H. rosa sinensis* contains a wide range of compounds. It was reported that phlobatannins, glycosides, saponins, flavonoids, terpenoids including other compounds such as thiamine, riboflavin and niacin are present in leaves, flowers, stem and roots. According to Patel and Adhav, whose their study was conducted on four different morphotypes of *H. rosa sinensis*, glucosides, flavonoids, phytosterols, terpenoids, tannins, and phenolic compounds contributed to the pharmacological effects of the plant as they were present in all of them. This suggested that although the flower color differed, the phytochemical constitions were very similar. These findings also correlates with those of another study carried out by thin layer chromatographic analysis.

Generally, the edible flowers contain moisture, nitrogen, fat, crude fibre calcium, phosphorus, and iron. The yellow flowers contain several flavones such as cyanidin-3,5-diglucoside, cyaniding-3-sophoroside3-5-glucoside quercetin-3,5-diglucoside, and quercetin-3,7diglucoside. Including the mentioned compounds, kaempferol-3-xylosylglucoside isolate can be found in white flowers. In addition to fatty acids,

fatty alcohols, hydrocarbons, the leaves also contain about 7.34 mg / 100 gm of carotene, as well as gentisic acid, mucilage, and catalase. On the other hand, cyclopropenoids can be found in root barks. Although flowers, stems, and leaves contain minor amounts of cyanin and cyanidin chlorides, quercetin can be found in all parts of *Hibiscus rosa sinensis*. However, β -sitosterol, teraxeryl acetate, and malvalic acids can be found only in stems and leaves.

Pharmacological effects

Antibacterial Activities: The methanol extracts prepared from the leaves of the *H. rosa-sinensis* were shown to have antimicrobial activities against *Pseudomonas aeruginosa*, *Escherichia coli*, *Enterobacter aerogenes*, and *Streptococcus pyogenes*. Using well diffusion method and after an incubation period of 24 hours at 37° C, the maximum observed zone of inhibition was 13 ± 00 mm and it was against *E. coli* followed by 12 ± 00 mm against both *S. aureus* and *E. aerogenes* at 80 μ g/ml concentration of leaves methanolic extract. These microorganisms were obtained from infected skins, and the chemical compounds responsible for the antibacterial activity may be due to flavonoids, tannins, terpenoids, saponins, or alkaloids identified in the study.

Antifungal Activities: 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 μ g/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.

Anticancer Activities: Oral cancer cell lines KB (ATCC CCL-17) were treated with 75 μ g and 125 μ g of *H. rosa sinensis* oil extract for 24 hours. After subjecting the treated cells to DNA fragmentation assay, and using agarose gel electrophoresis, it was observed that the cells' DNA from both concentrations has been fragmented compared to control sample. This means that Hibiscus extract hindered the growth and proliferation of oral cancer cells. It was also shown that 250 μ g of 90% methanolic leaves extract inhibited HT-29 colorectal AGS cell lines by 100%. The cell

viability percentage was measured using MTT assay and the calculated IC50 was found to be 90.79 µg/ml. The phytochemical analysis suggested that this significant anticancer activity was mostly due to flavonoids and terpenoids contents in the leaves.

Neuroprotective Activities: The methanolic extract of *H. rosa-sinensis* roots has beneficial effects on the central nervous system in Swiss albino mice and Wistar rats. Using acetic acid to induce writhing, 200 mg/kg i.p of extract resulted in an analgesic activity as inhibited the pain sensation by 78.5 %, compared to 81.0 % in 30 mg/kg Diclofenac treated group [66]. The number of head twitches induced by lithium was lowered to 10.2 ± 1.06 , compared to 9.0 ± 1.7 by ondansetron, a 5HT3 antagonist, as a positive control. Pentobarbital induced sleeping period was also extended, suggesting sedative effect by reducing dopaminergic transmission. The anxiolytic effect of roots extract was also demonstrated, as in elevated plus maze, mice spent more time in open arms. In addition, the extract's phytochemicals were tannins, flavonoids, saponin and glycosides.

Wound healing activity: The treatment of *Hibiscus rosa-sinensis* flowers ethanolic extract, which contained polyphenols, tannins, carboxylic acids, triterpenoids, and alkaloids, demonstrated wound healing activity in Sprague Dawley rats. After 15 days, using a daily dosage of 120 mg kg⁻¹ decreased period of epithelialization to 11.2 ± 0.13 , and resulted in 49% reduction in the wound area compared to only 33% in control group, evaluated by excision model. In dead space wounds and incision models, the extract also increased strength of skin breaking to 515.0 ± 39.56 , as well as granulation tissue's dry weight and hydroxyproline content to 33.50 ± 2.89 and 47.66 ± 10.64 , respectively.

Hair growth promoting activity: The petroleum ether leaf extract of *Hibiscus rosa sinensis* was proven to be a good hair growth promoter in a study involving Wister albino rats. After 14 days, the 5% w/w extract ointment resulted in 4.91 ± 0.261 mm hair length compared to 6.06 ± 0.431 mm in 2% minoxidil treated group, and 2.21 ± 0.108 mm in negative control group . The extract also contributed to 1937 ± 37.84 hairs per cm² area, while Minoxidil gave 2315 ± 05.78 hairs per cm² area. The alopecia was induced by exposure to sonic stress, and there were no side effects such as erythema or edema, compared to synthetic hair growth promoting ointment . Similarly, 5% per cm² area.

Anti-pyritic activity: The antipyretic effects of 250 mg/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 ± 0.145 to 37.5 ± 0.25 °C, whereas treatment with 30 mg/kg b.w paracetamol as positive control maintained it as 37 °C. The extract analgesic potentials were also examined at the same dosage using tail flicking test. The treatment increased reaction time as compared to 45 mg/kg b.w. diclofenac sodium treated and control groups, meaning that it weakened pain response [81]. Similarly, 500 mg/kg b.w of aqueous leaf extract managed to lower mice rectal temperature by 1.55 °C, 5 hours after extract consumption, compared to 2.00 °C using 10 mg/kg b.w acetaminophen as positive control.

Conclusion

Hibiscus rosa sinensis, which belongs to *Malvaceae* family, has been widely used as a traditional remedial plant in China and several tropical countries. 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.

This review has presented a comprehensive summary of recent studies on the phytochemistry and the medicinal uses of *H. rosa sinensis*. 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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