



Mini Review: Phytochemistry and Pharmacological Activity of *Hibiscus Rosa-Sinensis* Plant

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Abstract: *Hibiscus rosa-sinensis*, rose mallow, is one of the Malvaceae family. *Hibiscus rosa sinensis* is valued as an attractive, ornamental addition to a healing plant. traditionally to treat skin conditions, menorrhagia, bronchitis, demulcent, abortion, antifertility, contraception, and diuretics Numerous phytochemical components, including flavonoids, mucilage, alkaloids, saponins, phenolic acid, and polyphenols, define it. It has been documented that hibiscus flowers can be used as an anti-inflammatory, antipyretic, analgesic, and asthmatic. Numerous investigations have demonstrated that *Hibiscus rosa-sinensis* flowers have anti-oxidant, antifungal, and antibacterial qualities. This work aimed to mini-review and establish the available evidence and information about *Hibiscus rosa-sinensis* and its bioactive constituents and pharmacological activity uses. This study suggests future work for more novel chemical structural characterization quality control, molecular docking studies, and clinical trials.

Keyword: Minireview, phytochemical, *Hibiscus*, pharmacological, Malvaceae, *rosa-sinensis*

1. INTRODUCTIONS

Medicinal plants are significantly concentrated in bioactive natural chemicals and nutrients, which play a key role in promoting health and avoiding many ailments (Tawfeeq, A. A,et al., 2018). The Malvaceae family includes the evergreen shrub *Hibiscus rosa-sinensis*, and rose mallow (Kalwij JM.,2012). It is a type of tropical hibiscus from the order Malvales. *Hibiscus rosa sinensis* is valued as an ornamental and medicinal plant. Among the oldest blooming plants on Earth are the roughly 300 annual and perennial species of the genus *Hibiscus*, which are members of the Malvaceae family. The common names were Gudhal, Gurhal, Jaba, Mandaar, Japaphool, Jasum, Jasunt, Jaswand, Jiapushpa, and China Rose (Jasiem TM,2019).

Classification and Botany:

Hibiscus rosa-sinensis is a flowering plant that belongs to the phylum "Magnoliophyta" because it has true leaves, stems, roots, and carpels. It also goes to the "class" Magnoliopsida because it's a diploid plant, this clarifies that its flowers aggregate in groups of four to five. In addition, their leaves have veins resembling nets and bi-cotyledon seeds. It is also involved

below the order "Malvalves" because of its flower overlapping petals, numerous stamens, and fiber-rich phloem, which results in a harder bark (Pekamwar S.,et.al,2013).

1. Kingdom; *Hibiscus rosa-sinensis* belongs to (Plantae).
2. Subkingdom; *Hibiscus rosa-sinensis* belongs to (Tracheobionta).
3. Super division; *Hibiscus rosa-sinensis* subdivided from (Spermatophyta).
4. Division; *Hibiscus rosa-sinensis* divided from (Magnoliophyta).
5. Class; *Hibiscus rosa-sinensis* classified from (Magnoliopsida).
6. Subclass; *Hibiscus rosa-sinensis* subclass from (Dilleniidae).
7. Order; *Hibiscus rosa-sinensis* ordered from (Malvales).
8. Family; *Hibiscus rosa-sinensis* is from (Malvaceae family).

Distribution:

Tropical Asia is most likely where the plant originated. Although it was cultivated throughout China, Japan, and the Pacific Islands, it was formerly believed to have originated in South China. Rosa-sinensis, the "rose of China," is the name given to the plant with dark-red flowers. Currently, widely distributed of Asian origin (Pearline D, et.al,2015).

Description of Hibiscus rosa-sinensis:

Hibiscus rosa-sinensis is a kind of evergreen medium-height tree. Its evergreen branches have oval shapes with stalks, about width 10 cm. The trumpet-shaped flowers are enormous and showy, growing on very long stems. The petals combine from the corrupt to form the stamina column in the center. However, H. rosa-sinensis can be found in various corolla sizes, shapes, and colors, including yellow, orange, pink, and white. numerous variations come in single or double forms, with differences in size and color. The basic hues are light red, white, yellow, and red (Riaz G,2018).

Traditional uses:

The plant's leaves are used to treat skin conditions and menorrhagia. Fresh root juice or powdered root is given for gonorrhea. Leprosy, diabetes, epilepsy, and bronchial catarrh are treated with flowers. Ayurvedic medicine in India employed petal infusions to treat fever and bronchial catarrh. Hibiscus flowers and leaves treat diuretics, cough, menorrhagia, bronchitis, abortion, and infertility. Hibiscus blossoms have been used to make sachets and perfumes in Africa and other tropical regions. Hibiscus is also used for constipation in northern Nigeria(Salem MZ,2014). Traditional medicine uses the leaves as emollients to cure constipation, skin conditions, and burning sensations. The herb has been used as a diuretic and can treat nerve disorders and an antidiarrheal. Iranian bitter tea is used to treat high

blood pressure. Hibiscus flowers were used in herbal tea mixtures in Western nations (Sim, YY.,2020).

2. DISCUSSION AND RESULTS

Phytochemistry

Many phytochemical ingredients, such as flavonoids, alkaloids, saponins, tannins, and polyphenols, it was claimed that the leaves, flowers, stem, and roots comprise glycosides, paleobotanics, saponins, terpenoids, and flavonoids in addition to additional constituents including niacin, riboflavin, and thiamine (Udo,IJ.,2016). Constituents; including quercetin-3,7- glucoside. Also, cyanidin-3- glucoside and cyanidin 3,5 diglucoside have been recognized from the dark yellow colors of their flowers (Anand A,2017). White color flowers have kaempferol 3 xylosyl- glucoside, the existing of 3-5 glucoside ; quercetin-3,5-diglucoside and quercetin 3,7- diglucoside also reported. The quantitative phytochemical estimation of Hibiscus rosa showed that the flavonoids are the major constituents of flowers and leaves about 0.170 mg/g. the common flavonoids present quercetin, myricetin, kaempferol and rutin (Tawfeeq, A. A., et.al, 2024). In addition, plants rich in vitamins and minerals such as thiamine, ascorbic acid, niacin, riboflavin, and iron; exhibit good antioxidant capacity. Furthermore, the resulting components of GC-MS analyses of methanol extracts of hibiscus flowers demonstrated that β -sitosterol, Ethanimidic acid, and malvalic acids are present in stems and leaves, these ingredients possess anti-cancer, antioxidant, hypocholesterolemia, and anemia genic qualities (Purushothaman A.,2016).

Pharmacological activity

There have been reports of *Hibiscus rosa-sinensis* as an anti-inflammatory, antipyretic, analgesic, and asthmatic. Several studies have demonstrated flowers have the anti-oxidant, antifungal, and antibacterial qualities. The plant blossom is said to have anti-tumor, anti-spermatogenic, anti-androgenic, and anti-convulsant properties. There have also been reports of using flowers to cure cardiac conditions, and studies on diabetic rural populations have shown that *H. rosa sinensis* has anti-diabetic properties (Ahsan MQ,et.al,2021).

a. Antioxidant activity

Studies conducted on Hibiscus flower, stem, root, and leaf extracts have shown that the plant's phenolic components affect human health, including antioxidant activity and elimination of free radicals that can damage DNA. *H. rosa sinensis* demonstrated superior antioxidant activity and exhibited phenolic and flavonoid concentrations. The structure of the flavonoid molecule Hibiscetin-3-glucoside from the petals of *Hibiscus rosa sinensis* was established by spectrum analysis research, and it can also be utilized as a potent anticancer medication in the field of cancer therapy. It may be determined that the flower of *H.rosa*

enhances endogenous antioxidants and prevents inducing myocardial injury (Rengarajan S., et al., 2020).

b. Anti-hyperglycemia

There have also been reports of using flowers to cure cardiac conditions, which supports the anti-diabetic effects of *H. rosa sinensis* in rural populations with diabetes. Compared to metformin, plant extract significantly increased the incidence of hypoglycemia and raised insulin sensitivity, A novel flavanol extracted from Hibiscus Flowers was found to have strong hypoglycemic action (Mamun A., et al, 2013).

c. Effects on CNS

Swiss albino mice and Wistar rats' central nervous systems benefit from the methanolic extract of *Hibiscus rosa* roots. About 200 mg/kg i.p. of the extract showed pain-relieving effectiveness, inhibiting pain perception by 78.5%, as opposed to 81.0% in the group treated with 30 mg/kg of Diclofenac. Additionally, it was shown that the root extract had an anxiolytic effect (Nade, V.S., et al, 2009).

d. Anti-microbial

The crude leaf extract of *H. rosa-sinensis* revealed a good inhibition from percentage of the minimum inhibitory concentrations (MICs) against *Salmonella*, *P. aeruginosa*, *Serratia*, *Micrococcus*, *E.coli*, and *Enterobacter* (Maraskolhe D., et al, 2020).

e. Cytotoxic activity:

Cancer affects people worldwide; natural compounds are attracting scientific attention Due to their lower side effects than chemotherapy. Moreover, using the MTT test, the cytotoxic potential of *Hibiscus rosa-sinensis* flower extracts in aqueous and chloroform was examined in contrast to MCF7 cell lines. In a dose-dependent method; the study demonstrated a significant decrease in cell viability against MCF-7 cell lines. At concentrations of 100 and 200 µg/ml, respectively, the mean IC₅₀ values of the chloroform extract and aqueous extract were 46.1±2.816% 61.88 ±0.662%, and 42.91 ±0.104% and 56.29 ±0.083%, respectively. The *Hibiscus rosa-sinensis* flower aqueous extracts exhibited a dose-dependent inhibition of melanoma cell growth cells. Further studies demonstrate that subjecting melanoma cells to aqueous *H. rosa-sinensis* flower extract blocks the growth of melanoma cells in a dose-dependent way (Hussein Ahmed, O., et al, 2024).

f. Anti-obesity:

Hibiscus rosa-sinensis phytoconstituents (22 compounds) were subjected to a molecular docking investigation against seven obesity targets, including pancreatic lipase, fat and obesity protein (FTO protein), cannabinoid receptors, and hormones such as leptin and

ghrelin. Finding a novel anti-obesity medication may be facilitated by docking phytoconstituents to seven recognized targets for obesity (Gandhi SP, et al., 2019).

g. Effect on GIT

H. rosa sinensis extract is used on peptic ulcers revealing effects on the total acidity of gastric secretions. Roselle has significantly increased gastric wall mucus secretion and decreased basal gastric acid secretions (Alqasoumi S., et al, 2010). It has been shown that HPE contains a variety of polyphenols, The concentration-dependent method, HPE-induced cell demise in eight distinct cell lines. The cells most affected by HPE were those of human gastric cancer (AGS) (0.95 mg/mL HPE reduced its proliferation by 50%). After 24 hours of HPE (2.0 mg/mL) treatment, cells demonstrated DNA fragmentation and a 52.36 % increase in hypodiploid phase distribution (Lin HH., et al, 2005).

3. CONCLUSIONS

Hibiscus rosa sinensis is thoroughly reviewed. This study provides a comprehensive assessment of research on phytochemical studies and traditional pharmaceutical investigations. This study suggests future work for more novel chemical structural characterization quality control, molecular docking studies, and clinical trials.

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5. REFERENCES

- Ahsan, M. Q., Alam, M. T., Chowdhury, M. M., Nasim, M. T., & Islam, S. M. (2021). In vitro and in vivo evaluation of pharmacological activities of *Pouzolzia sanguinea*. *Journal of Bio-Science*, 29(2), 31-42. <https://doi.org/10.3329/jbs.v29i2.48791>
- Tawfeeq, A. A., Tawfeeq, T. A., Al Naqqash, Z. A., & Kamal, Z. A. (2024). Phytochemical Investigation and GC-MS analysis of *Tribulus terrestris* L. cultivated in Iraq. *OBAT: Jurnal Riset Ilmu Farmasi dan Kesehatan*, 2(5), 22-29. <https://doi.org/10.61132/obat.v2i5.594>
- Alqasoumi, S., Al-Dosari, M. S., Al-Sohaibani, M., Al-Howiriny, T., Al-Yahya, M., & Rafatullah, S. (2010). Gastric ulcer protective activity of *Hibiscus sabdariffa*: An experimental, biochemical and histological study. *Clinical and Experimental Medicine*, 4(1), 115-127. <https://doi.org/10.1007/s10238-010-0051-2>
- Anand, A., & Sarkar, B. (2017). Phytochemical screening and antioxidant property of anthocyanins extracts from *Hibiscus rosa-sinensis*. In *Applications of Biotechnology for Sustainable Development* (pp. 139-147). Springer Singapore. https://doi.org/10.1007/978-981-10-3066-8_10

- Gandhi, S. P., Lokhande, K. B., Swamy, V. K., Nanda, R. K., & Chitlange, S. S. (2019). Computational data of phytoconstituents from *Hibiscus rosa-sinensis* on various anti-obesity targets. *Data in Brief*, 24, 103994. <https://doi.org/10.1016/j.dib.2019.103994>
- Goldberg, K. H., Yin, A. C., Mupparapu, M., Retzbach, E. P., Goldberg, G. S., & Yang, C. F. (2017). Components in aqueous *Hibiscus rosa-sinensis* flower extract inhibit in vitro melanoma cell growth. *Journal of Traditional and Complementary Medicine*, 7(1), 45-49. <https://doi.org/10.1016/j.jtcme.2016.10.007>
- Hussein Ahmed, O., Jawad, E., Amer Tawfeeq, A., & Jabir, M. (2024). Review of the usage of medicinal herbs in the treatment of cancer. *Journal of Medicinal Plants Research*, 10, 3124-3134. <https://doi.org/10.5897/JMPR2024.1234>
- Jasiem, T. M., Nasser, N. M., Baderden, S. K., & Hasan, H. A. (2019). Pharmacognostical and phytochemical studies of Iraqi *Hibiscus rosa-sinensis*. In *AIP Conference Proceedings* (Vol. 2144, No. 1, pp. 1-9). <https://doi.org/10.1063/1.5112216>
- Kalwij, J. M. (2012). Review of 'The Plant List, a working list of all plant species'. *Journal of Vegetation Science*, 23(5), 998-1002. <https://doi.org/10.1111/j.1654-1103.2012.01432.x>
- Lin, H. H., Huang, H. P., Huang, C. C., Chen, J. H., & Wang, C. J. (2005). Hibiscus polyphenol-rich extract induces apoptosis in human gastric carcinoma cells via p53 phosphorylation and p38 MAPK/FasL cascade pathway. *Molecular Carcinogenesis*, 43(2), 86-99. <https://doi.org/10.1002/mc.20127>
- Mamun, A., Islam, S., Alam, A. K., Rahman, M. A., & Rashid, M. (2013). Effects of ethanolic extract of *Hibiscus rosa-sinensis* leaves on alloxan-induced diabetes with dyslipidemia in rats. *Bangladesh Pharmaceutical Journal*, 16(1), 27-31. <https://doi.org/10.3329/bpj.v16i1.14856>
- Maraskolhe, D., Chimurkar, L., Kamble, P., & Deotale, V. (2020). Evaluation of an antibacterial effect of *Hibiscus rosa-sinensis* leaves and petals extract along with antibiotics on *Escherichia coli*: In vitro study. *International Journal of Current Research and Review*, 12(6), 18-27. <https://doi.org/10.31782/IJCRR.2020.12602>
- Missoum, A. (2018). An update review on *Hibiscus rosa-sinensis* phytochemistry and medicinal uses. *Journal of Ayurvedic and Herbal Medicine*, 4(3), 135-146. <https://doi.org/10.18502/jahm.v4i3.2813>
- Nade, V. S., Kawale, L. A., Dwivedi, S., & Yadav, A. V. (2009). Neuropharmacological evaluation of *Hibiscus rosa-sinensis* roots in experimental animals. *Journal of Natural Remedies*, 9, 142-151. <https://doi.org/10.18311/jnr/2009/1479>
- Pearline, D., Kamat, N., & Thiagarajan, P. (2015). *Rosa sinensis* (*Hibiscus*)—a versatile Indian origin plant. *Journal of Chemical and Pharmaceutical Sciences*, 8(4), 970-974. <https://www.jchps.com>
- Pekamwar, S. S., Kalyankar, T. M., & Jadhav, A. C. (2013). *Hibiscus rosa-sinensis*: A review on ornamental plant. *World Journal of Pharmacy and Pharmaceutical Sciences*, 2(6), 4719-4727. https://www.wjpps.com/WJpps_controller/abstract_id/2038

- Purushothaman, A., Meenatchi, P., Saravanan, S., Sundaram, R., & Saravanan, N. (2016). Quantification of total phenolic content, HPLC analysis of flavonoids and assessment of antioxidant and anti-haemolytic activities of *Hibiscus rosa-sinensis* L. flowers in vitro. *International Journal of Pharmaceutical Research & Health Sciences*, 4(5), 1342-1350. <https://ijprhs.com>
- Rengarajan, S., Melanathuru, V., Govindasamy, C., Chinnadurai, V., & Elsadek, M. F. (2020). Antioxidant activity of flavonoid compounds isolated from the petals of *Hibiscus rosa-sinensis*. *Journal of King Saud University - Science*, 32(3), 2236-2242. <https://doi.org/10.1016/j.jksus.2019.12.001>
- Riaz, G., & Chopra, R. (2018). A review on phytochemistry and therapeutic uses of *Hibiscus sabdariffa* L. *Biomedicine & Pharmacotherapy*, 102, 575-586. <https://doi.org/10.1016/j.biopha.2018.03.023>
- Salem, M. Z., Olivares-Pérez, J., & Salem, A. Z. (2014). Studies on biological activities and phytochemicals composition of *Hibiscus* species: A review. *Life Science Journal*, 11(5), 1-8. <https://www.lifesciencesite.com>
- Sim, Y. Y., & Nyam, K. L. (2021). *Hibiscus cannabinus* L. (kenaf) studies: Nutritional composition, phytochemistry, pharmacology, and potential applications. *Food Chemistry*, 344, 128582. <https://doi.org/10.1016/j.foodchem.2020.128582>
- Tawfeeq, A. A., Mahdi, M. F., Abaas, I. S., & Alwan, A. H. (2018). Phytochemical and anti bacterial studies of leaves of *Rosmarinus officinalis* cultivated in Karbala, Iraq. *Al Mustansiriyah Journal of Pharmaceutical Sciences*, 17(2), 9. <https://doi.org/10.32947/ajps.v17i2.48>.
- Uddin, B., Hossan, T., Paul, S., Ahmed, T., Nahar, T., & Ahmed, S. (2010). Antibacterial activity of the ethanol extracts of *Hibiscus rosa-sinensis* leaves and flowers against clinical isolates of bacteria. *Bangladesh Journal of Life Sciences*, 22(2), 65-73. <https://doi.org/10.3329/bjls.v22i2.8318>
- Udo, I. J., Ben, M. G., Etuk, C. U., & Tiomthy, A. I. (2016). Phytochemical, proximate and antibacterial properties of *Hibiscus rosa-sinensis* L. leaf. *Journal of Medicinal Plants Studies*, 4(5), 193-195. <https://www.jmsponline.com>