



A Detailed Review On Hibiscus Rosa – Sinensis .

**Names of authors- Miss Jamble Snehal Dnyandeo , Miss. Rodage Sonal Mahadev,
Miss Domale Snehal Dattatray, Domale, Ms. Hole Komal.**

Name of Department -Pharmacognosy & phytochemistry

Name of organisation -Institute of pharmaceutical science and research (for girls), Swami chincholi ,Tal-
Daund,Dist-Pune.

Abstract :

As a member of the Malvaceae family, Hibiscus rosa Sinensis is sometimes referred to as China rose. In some tropical nations, this plant is utilized for a variety of significant therapeutic purposes, including the treatment of gastric ulcers, diabetes, fungal and bacterial infections, hair loss, and wounds, inflammation, fever, and cough. Flavonoids, tannins, terpenoids, saponins, and alkaloids are the primary bioactive components identified by the phytochemical research as being responsible for the plant's therapeutic benefits. Recent studies' experimental results demonstrated that various extracts from all parts of Hibiscus rosa – Sinensis exhibited wide range of positive effects, including hypotensive, anti-pyretic, anti-inflammatory, anti-cancer, antioxidant, anti-bacterial, anti-diabetic, wound-healing, and abortifacient activities. According to histological examination, the limited investigations on toxicity showed that the majority of extracts from all parts of this plant did not demonstrate any indicators of toxicity at higher doses. The hibiscus rosa-sinensis (HS) flower is well-known in India and serves in Lord Ganesha devotion. Shampoo, hair dye, lotions for treating wounds, and skin care products all contain these flowers. The objective in this article is to review the chemical components, variations, scientific classification, pharmacological effects, and traditional usage.

Keywords : Pharmacological effects, Phytochemistry , Classification , Geographical Distribution, Precautions, Biological Activity.

Introduction : Since Hibiscus rosasinensis is primarily found in south-east China and a few islands in the Pacific and Indian Oceans, it is frequently referred to as the "Queen of The "China rose" or the "Tropics." Hibiscus, one of Hawaii's favorite national plants, is commonly used in ceremonial Function [1,2]. This plant is a vascular plant with seed production that belongs to the subkingdom Magnoliophyta and the class Magnoliopsida. It is one among the 300 species in the Hibiscus genus and a member of the Malvaceae family [1]. Additionally, the juice produced from the leaves and petals has long been used as a herbal cosmetic known as wilting as well as a natural cure for a number of illnesses and uncomfortable symptoms[3,4]. Eyeliners and shoe blacking are both made with extract from dark flowers [4]. The eminent Swedish biologist Carolus Linnaeus is thought to have given the species its Latin name, rosa sinensis, which translates to "Rose of China" in the early 1750s [5]. Hibiscus blossoms have historically been used as analgesics, antipyretics, anti-asthmatics, and anti-inflammatory medicines. They have also been claimed to have anticancer qualities. Hibiscus rosa-sinensis flower petals contain anti-oxidant, anti-fungal, and antibacterial effects, according to numerous research [6]. Hibiscus extracts from stems, roots, leaves, and flowers have been studied, and it has been discovered that the photochemical components of the plant have positive effects on human health, such as antioxidant activity, which is the elimination of free radicals that can cause DNA damage [7]. Senna bicapsularis L. flower extracts, better known by its common name of Cassia, are another example of plant sources of antioxidants [7, 8]. In rural areas of India, the blossoms were also employed as an abortifacient and a method of contraception for both sexes [9]. More than 50% of today's therapeutic drugs, according to recent scientific research, are derived from natural products. Many of them have made important contributions to the pharmaceutical business and the creation of more

effective treatments for various ailments [10]. Due to its application in herbal products and therapeutic purposes, this plant is quite important commercially [10]. There hasn't been any clinical testing on the chemical extracts of *Hibiscus rosa-sinensis*, which could be essential in determining its rapid potential for medical uses, due to the lack of sufficient contemporary pharmacological knowledge.



Fig.1. Hibiscus Flower

Classification and Botany : *Hibiscus rosa-sinensis* belongs to the family 'Magnoliophyta', due to it's a flowering plant that has true leaves, stems and roots, and also has carpels that cover ovules, and to the 'class' Magnoliopsida, as it is an embryo type of plant which means that it flowers in groups of four/five, its leaves display netlike viens, and its seeds have two cotyledons [11]. Additionally, it is categorized in the 'Malvalves' order since the flower's petals overlap, it has several stamens, and the phloem is made up of fibers that result in a tougher bark [11]. It is likewise a member of the Malvaceae family and may be found almost everywhere, with the exception of very cold climates. It typically grows as small trees or bushes and produces bristly pollen. Last but not least, the genus "Hibiscus" contains more than 250 native species, including the *H. rosa-sinensis* species [12]. Evergreen, ovate-branched, and with stalks that are 10 cm wide and 15 cm long, *Hibiscus rosa-sinensis* grows in little trees known as "shrubs," which are often 4 meters tall [13,14]. The majority of the time, flowers are found on long stalks. They are about 20 cm broad, have five smooth-edged, oval, egg-shaped whorled petals, and are united at the base of the central stamina column [13,14]. A style with five lobes at the tip and numerous yellow anthers is part of this central column. Moving on to the flower's exterior, we can see that its cup-shaped calyx measures 2.5 cm long, and its epicalyx is made up of 5 or 7 bracteoles that are each 1 cm long. On the upper leaves, which are typically oval in shape, glossy green, and have pointy tips and pinnate veins, flowers are typically borne singly [13,14]. According to some reports, fruits sporadically -- and if so, very infrequently -- can develop as 3 cm long capsules. Though *H. rosa-sinensis* (Figure 1) has corollas in a variety of sizes, shapes, and colors, including yellow, orange, pink, and white [15,16,17], the plant's wild type is still characterized by intensely crimson flowers that only appear in one form.[18].



Hibiscus rosa sinensis phenotypes, shown in Figure 2, include red (the most typical color), pink, white, orange, and yellow [15,16,17,18].

Photochemistry : A variety of chemicals can be found in *H. rosa sinensis* in every region of the plant (Figure 3). Phlobatannins, glycosides, saponins, flavonoids, terpenoids, and other substances including thiamine, riboflavin, and niacin were found to be present in leaves, flowers, stems, and roots, according to a report [19]. As they were found in all four morphotypes of *H. rosa sinensis*, glucosides, flavonoids, phytosterols, terpenoids, tannins, and phenolic substances reportedly contribute to the pharmacological effects of the plant, as stated by Patel and Adhav, whose study carried out on it [20]. This revealed that despite differences in bloom hue, phytochemical compositions were quite similar. Additionally, these results agree with those of a different study that used thin layer chromatographic analysis [21]. The typical nutritional composition of edible flowers includes moisture, nitrogen, fat, crude fiber, calcium, phosphorus, and iron. Numerous flavones, including cyanidin-3,5-diglucoside and cyanidin-3-sophoroside, are present in the yellow blossoms. 3- to 5-glucoside the quercetins 3,5-diglucoside and 3,7-diglucoside. White flowers contain kaempferol-3-xylosylglucoside isolate, along with the previously indicated substances [22]. The leaves also include gentisic acid, mucilage, catalase, and around 7.34 mg of carotene per 100 gm, in addition to fatty acids, fatty alcohols, and hydrocarbons. On the other hand, root barks contain cyclopropenoids. Quercetin is present in all sections of *Hibiscus rosa sinensis*, despite the fact that cyanin and cyanidin chorides are only present in trace levels in the flowers, stems, and leaves. But only the stems and leaves can contain β -sitosterol, taraxeryl acetate, and malvalic acids [22]. There is a substantial association between antioxidant activity and the flavonoids, phenolics, and anthocyanins present in the extracts, according to a recent study on the antioxidant properties of *H. rosa sinensis*. This demonstrated that these components were in fact in charge of the antioxidant activity seen [23]. Anthocyanins have unique natural coloring capabilities, even though the majority of these phytochemicals have potential benefits in medicine, which will be covered in more detail in the section after this one [24]. It was shown that the dye uptake process of cotton and silk fabrics was improved in terms of fastness when utilizing metal mordants including Cu, Sn, and Al in combination with *Hibiscus rosa sinensis* anthocyanin extract [24]. This might be mostly as a result of its antioxidant action.

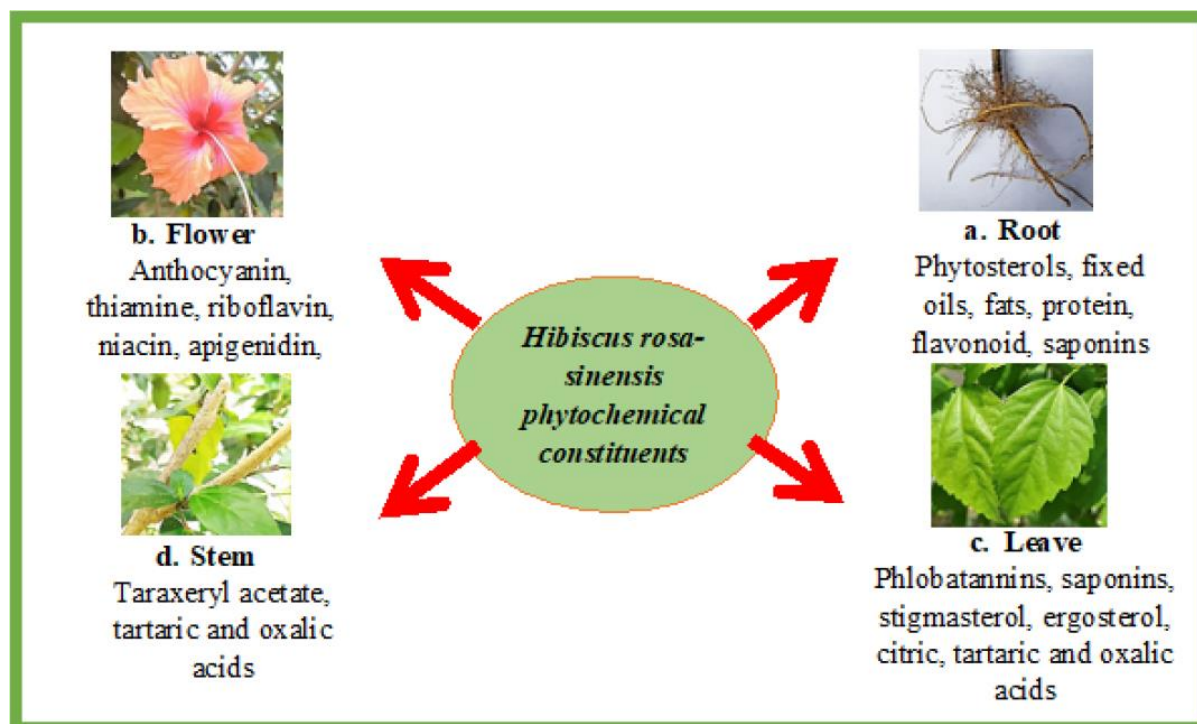


Fig.3. components of the phytochemical plant *Hibiscus rosa-sinensis*. [25]

Pharmacological Activities of *Hibiscus Rosa – Sinensis* : The natural resource *hibiscus rosa-sinensis* comprises a variety of substances with a wide range of pharmacological effects that can aid in the creation of new therapeutic formulations. Studies on the pharmacological effects of *Hibiscus rosa-sinensis*

leaves, barks, roots, and flowers, which have been utilized to cure a variety of illnesses including aphrodisiac, hypertension, wound healing, diabetes mellitus, and cancer, have been done[26]. They have demonstrated that diverse plant parts may possess a variety of qualities, including antioxidant, anti-inflammatory, anti-microbial, and anti-ulceration (Figure 4)[27]. This plant has also been used traditionally to regulate dysfunctional uterine hemorrhage and as an oral contraceptive, and it is an ingredient in many herbal cocktails and mixtures[26,27]. As a result, pharmacological investigations on *Hibiscus rosa-sinensis* are being targeted in order to confirm and gather proof of the efficacy and pharmacological activity claimed for the plant.

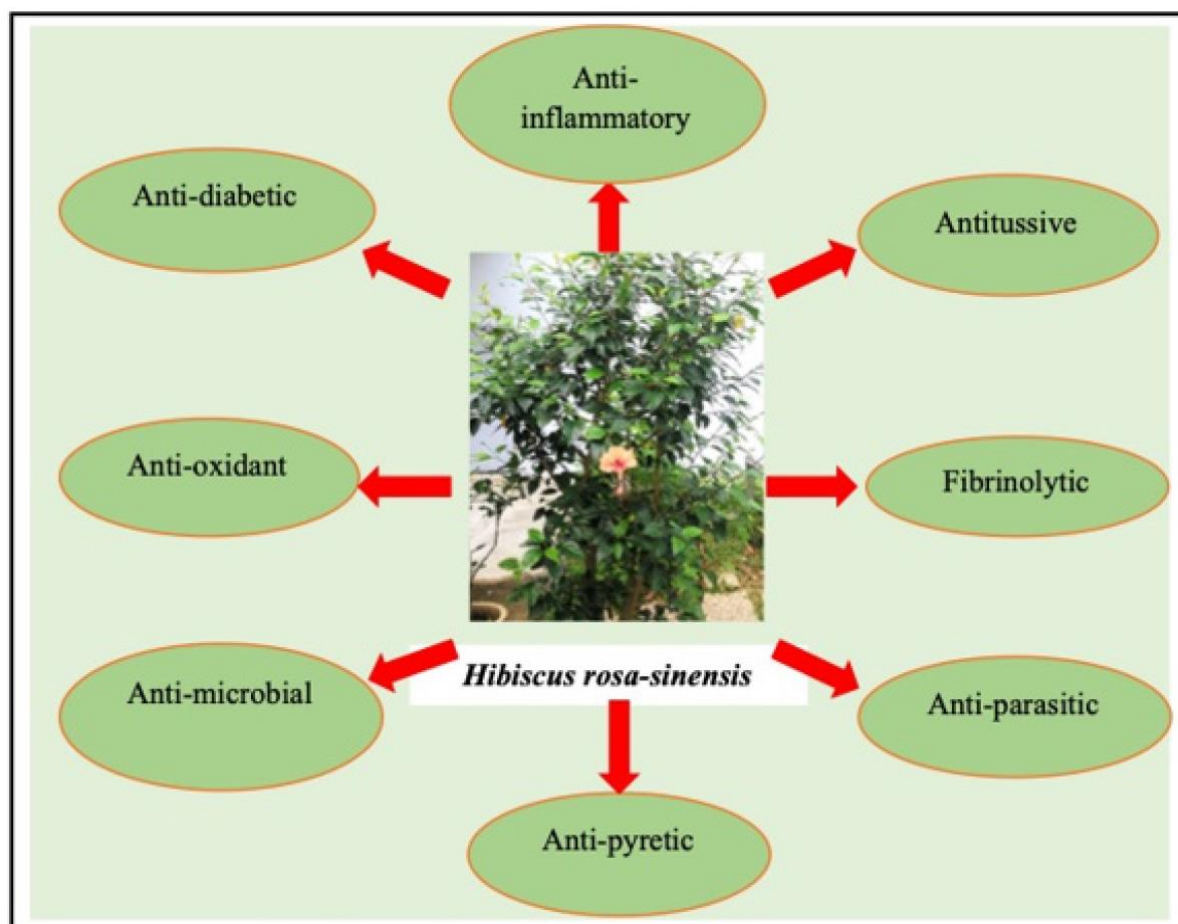


Fig.4. Pharmacological properties of *Hibiscus rosa-sinensis*

Anti – Inflammatory : Numerous substances found in *Hibiscus rosa-sinensis*, including flavonoids, steroids, and saponins, have anti-inflammatory properties. The ethanol extracts of the flower and leaf of two separate *Hibiscus rosa-sinensis* species—red *Hibiscus rosa-sinensis* L. and white *Hibiscus rosa-sinensis* var. *alba*—were shown to contain these chemicals, according to a study by Raduan et al.[28]. Different pathways were used by flavonoids, saponins, and steroids to exert their anti-inflammatory effects. By preventing the synthesis of Reactive Oxygen Species (ROS) and suppressing various inflammatory mediators like Nuclear Factor-kappa B (NF- κ B) and Signal Transducers and Activators of Transcription (STAT) in the signaling pathway, flavonoids and saponins reduce inflammation[29].

Anti – Oxidant : A chemical known as an antioxidant is one that prevents or slows the process of cell damage brought on by free radicals or other unstable molecules that are naturally occurring in the body[30]. By inhibiting the production of radicals, acting as free radical scavengers, or speeding up the breakdown of radicals, antioxidants work to stop cell damage[31]. Numerous chronic diseases, including cancer, cardiovascular disease, and also cataracts, which are linked to free radicals[31]. If exogenous antioxidants come from food, dietary supplements, or plant-based antioxidants, endogenous antioxidants are created by the body. According to a study by Garg et al., the antioxidant activity of *Hibiscus rosa-sinensis* was assessed using a number of tests, including

the 2,2-diphenyl-1-picrylhydrazyl (DPPH), Nitric Oxide (NO), and Hydrogen Peroxide (H₂O₂) radical scavenging assays[32]. These evaluations used a methanolic and aqueous extract of the Hibiscus rosa-sinensis stem and leaves[32]. Based on the percent inhibition of DPPH and ferric reducing antioxidant power (FRAP) experiments, the radical scavenging activity of Hibiscus rosa-sinensis flower extracts was assessed. The findings demonstrated that the flower sample had a substantial amount of antioxidant conditioning and was dependent on birth detergents. A water-free hibiscus extract has high levels of tannin and anthocyanins as well as strong antioxidant properties that might reduce ferric oxide.[33].

Anti – Diabetic : A condition known as hyperglycemia results from diabetes mellitus, which is a disorder in which the body is unable to make enough insulin or cannot respond to it normally. As a result, the blood sugar concentration rises, leading to the problem. One of the main public health issues in Malaysia is diabetes mellitus, and 2.8 million persons over the age of 30 are affected by type 2 diabetes, which affects 20.8% of the population[34]. Because active phytoconstituents that imitate the effects of insulin and have hypoglycemic qualities are present in herbal remedies, they have historically been used as sources for anti-diabetic medications[35].

Anti – Microbial Activity : Hibiscus rosa-sinensis has been shown to have anti-microbial properties in numerous investigations. The Hibiscus rosa-sinensis flower's methanolic and ethanolic extracts have been shown in a study by Ruban et al. to have effects against human infections such Salmonella sp., Streptococcus sp., Escherichia coli, Pseudomonas aeruginosa, and Staphylococcus aureus[36]. Flavonoids, tannins, alkaloids, and triterpenoids are examples of active ingredients in extracts that may contribute to their antibacterial properties[36]. However, neither the disc diffusion nor the agar diffusion procedures revealed any inhibition for the methanolic flower extract of Hibiscus rosa-sinensis[36].

Effect on hair growth : Using both in vivo and in vitro techniques, petroleum ether extracts of the leaves and flowers of Hibiscus Rosa-sinensis have been used to assess the potential for hair growth. A 1% liquid paraffin extract was applied topically to the shaved skin of albino rats using an in vivo approach, and the results were monitored carefully for a while. At various intervals of time, the length of hair and the various cyclic stages of hair follicles, such as the anagen and telogen phases, were observed. The hair follicles from neonatal albino rats were separated and cultivated in DMEM with 0.01 mg/ml petroleum ether extract of leaves and flowers using an in vitro approach. On hair, it was found that the leaf extract was more potent than the flower extract[37]

Description :

Antonyms :

An alternative name for this word is Bombycidendron Zoll. Additionally, there are Moritzi, Bombycodendron hassk, Brockmania W.Fitzg, Pariti Adnas, and Wilhelmina hochr. [38].

Natural SOURCES: The hibiscus, a type of flowering plant in the malvaceous category of herb material[38].

Chemical Components :

Hibiscus rosa sinensis contains proteins, saponins, cardiac glycoside, glucose, drop sugars, crucial lubricant, steroids, anthraquinones, tannins, alkaloids, flavanoids, and anthocyanins, among other chemical components.

USES: One of the most effective anti-aging factory actives, hibiscus has a wonderful reputation for enhancing skin pliability and provides a beautiful, all-natural youth-boost. Hibiscus has the amazing capacity to suppress the activity of the enzyme elastase, which is responsible for

breaking the priceless elastin in our skin. As a result, it firms and lifts your skin while valiantly fighting the aging process.[38]

Benefits for skin include:

Among the advantages for skin are:

- a) fighting aging symptoms;
- b) unclogging skin pores.
- c) tightening and skin-opening force.
- d) excluding inflammation and acne.
- e) quickening the repair of cracks.
- f) Preserve skin's collagen

Scientific Class :

Malvacea (family: Malvacea)

Hibiscus Rosa Sinensis

Kingdom: Plantae

Class: Magnoliopsida

Division: Magnoliophyta

Family: Malvaceae

Order: Malvales

Genus: Hibiscus L.

Species: rosa

Table 1. Taxonomy and common name of Hibiscus rosa sinensis[39].

Taxonomy	
Name	Hibiscus rosa sinensis
Family	Malvaceae
Common name in India	
Andhra Pradesh	Dusanna
Assamese	Jiwa, Joba
Bengali	Oru
Gujarati	Jasvua, Jasunt
Hindi	Guthur, Jassoon, Jasum, Jasund, Jasut, Java, Odhul
Malayalam	Dasavala
Kannasa	Dasavala
Manipuri	Jabakusum
Marathi	Dasindachaphula, Jasvand, Jasund
Mizoram	China Pangpar, Midumpangpar

Geographical distribution : Red hibiscus's historical antecedents and geographic range are unclear. There are about 200 species of Hibiscus, which are found in tropical and subtropical areas. From sea level to 500 meters in altitude, hibiscus is frequently grown as a decorative plant in gardens. It is vulnerable to frost and will freeze in mild winters, although it will resprout in the spring from the ground. It thrives in healthy soil with lots of organic matter and full sun[39].

Precautions to Take With Hibiscus :

People need to take caution when eating hibiscus extract, especially those with kidney and cardiac conditions[40].

▣ Cardiac disorders

When taking non-potassium sparing diuretics (drugs that increase urine production and treat oedema), patients with high blood pressure should exercise caution. The diuretic effect of hibiscus extract may exert pressure on blood vessels if the dose exceeds the recommended level, leading to death from heart failure.

▣ Kidney dysfunction

Hibiscus juice use should be discussed with a doctor if a patient has kidney stones or other kidney issues since excessive consumption might raise blood creatinine levels, which can impair kidney function.[40].

▣ Pregnancy.

It is unclear whether hibiscus may be used safely by pregnant women. In this situation, it is best to follow your doctor's instructions[41].

. Children.

It is uncertain whether it is healthy for breastfeeding moms to take hibiscus extract because doing so could lead their babies to grow more weight after birth and put off puberty of their kids. Before taking hibiscus, lactating moms should seek medical advice[40,41].

Interactions With Other Drugs:

When taken with any medication, hibiscus juice may worsen its toxicity and adverse effects as well as reduce its effectiveness. Hibiscus sweetened water extract may interact with acetaminophen (paracetamol), decreasing the drug's effectiveness when taken simultaneously[42]. Let's say you also take any drugs. In that situation, you should speak with your doctor about any potential pharmacological interactions the medication may have with any fruits, vegetables, or herbs. This will assist you in avoiding any potential drug interactions with any herb or vegetable.

Clinical Trials on the Biological Activities of Calyxes from *Hibiscus sabdariffa* :

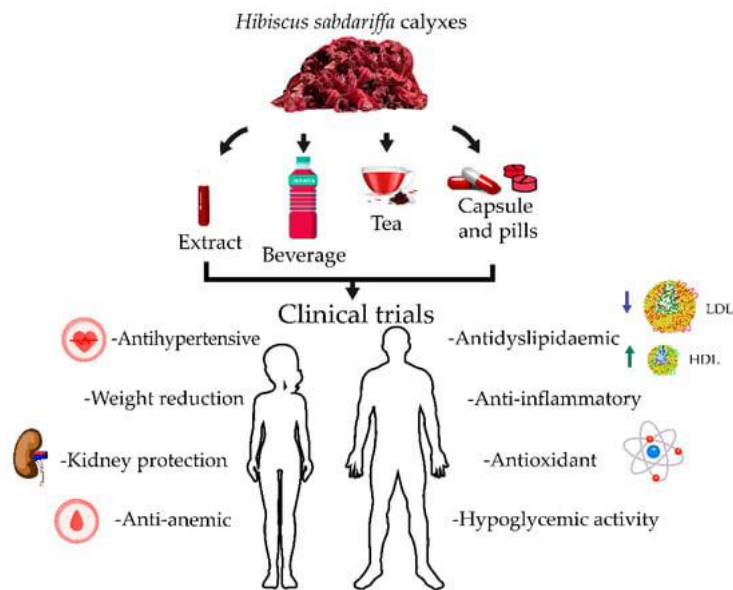


Fig.5 Biological Activity

Because of their body fat mass reduction effects and antihypertensive, anti-dyslipidemic, hypoglycemic, antianemic, nephroprotective, antioxidant, anti-xerostomic, and anti-inflammatory properties, HS calyxes are frequently used in non-pharmacological therapy to prevent or control a variety of chronic non-communicable diseases[43].

Conclusion :

The current review covered the chemical components, pharmacological actions, and therapeutic significance of *Hibiscus rosa-sinensis* as a promising medicinal plant with a wide range of pharmacological activities that could be used in numerous medical applications due to its efficacy and safety. It is concluded that the extract from *Hibiscus roesus* has pharmacological activity based on the results obtained. The plant works well as a herbal alternative to many diseases, including those that are antipyretic, antiparasitic, antibacterial, anti-inflammatory, that promote hair development, that treat wounds, that are anticonvulsant, that are antioxidant, etc.

References :

1. Mercuri A, Bruna S, Lanteri S, and Portis E. An evaluation of the genetic diversity of *Hibiscus rosa-sinensis* and its position within the *Hibiscus* genus complex using AFLP technology. 123(3):372-378 in *Scientia Horticulturae* (2010).
2. Freitas-Asta J, Carillo J, Borth WB, Melzer MJ, Simbajon N, Kitajima EW, et al. A cilevirus infects ornamental hibiscus in Hawaii. *Archives of Virology*. 2013;158(11):2421–2424.
3. Review of the herbs utilized in the creation of poly herbal hair oil by Reddy UK, Rajesh S, Sindhu G, and Aruna B. 2017;4(6):1527–1539 in the *Indo American Journal of Pharmaceutical Research*.
4. *Hibiscus rosa-sinensis* phytochemical analysis and antibacterial activity, Kumari OS, Rao NB, Reddy VK. 2015;4(5):766-771 in the *World Journal of Pharmacy and Pharmaceutical Sciences*.
5. FTIR spectroscopic study of phytochemical extracts from *Hibiscus rosa-sinensis* L. utilized for hair disorders, Gomare KS, Mishra DN. 2018;70–75 in *International Journal of Recent Trends in Science and Technology*.
6. *Hibiscus rosa-sinensis* leaf extracts' phytochemical screening and antibacterial activity was studied by Vastrad JV and Byadgi SA. 2018;7(3):3329-3337 in *International Journal of Current Microbiology and Applied Sciences*.
7. Zubairi SI, Jaies NS. *Hibiscus rosa sinensis* leaves: Analysis of proximate, antioxidant activities and inorganic compound. *Malaysian Journal of Analytical Sciences*. 2014;18(2):260-270.
8. Antioxidant and antibacterial properties of *Hibiscus* (*Hibiscus rosa-sinensis* L.) and *Cassia* (*Senna bicapsularis* L.) flower extracts, Mak YW, Chuah LO, Ahmad R, and Bhat R. *King Saud University Journal of Science*, 25(4), 275-282 (2013).
9. Das SK and Bhakta S. A critique of the rural traditional medicine for contraception, *Hibiscus rosa sinensis*. 2017;1(9):77-79 in *International Journal of Engineering and Information Systems*.
10. Etuk CU, Udo IJ, Ben MG, and Tiomthy AI. *Hibiscus rosa-sinensis* L. Leaf has phytochemical, proximate, and antibacterial activities. 2016;4(5):193–195 in *Journal of Medicinal Plants Studies*.
11. Pekamwar SS, Kalyankar TM, Jadhav AC. *Hibiscus rosa-sinensis* : a review on ornamental plant. *World Journal of Pharmacy and Pharmaceutical Sciences*. 2013;2(6):4719–4727.
12. A. Noman, M. Aqeel, M. Javed, S. Zafar, Q. Ali, W. Islam, et al. *Hibiscus rosa-sinensis* histological alterations support site adaptation and phytoremediation for industrially contaminated areas. 2017;27(5):1637–1648 in *The Journal of Animal & Plant Sciences*.

13. Macro- and micromorphological investigation of the leaf, stem, flower, and root of *Hibiscus rosa-sinensis* L. *Journal of Applied Sciences Research*. 2012;8(1):34-56. El Sayed ZI, Ateya A-MM, and Fekry M.
14. *Hibiscus rosa sinensis* Linn and phytochemicals have anti-inflammatory, analgesic, and antipyretic properties, according to Begum Z, Younus I, and Ali SM. 2015;4(12):116-123 in *World Journal of Pharmacy and Pharmaceutical Sciences*.
15. *Hibiscus rosa-sinensis* (Malvaceae) Genetic Variation Among Different Flower Colors Using ISSR and Isozymes, by Hammad I. 2009;3(1):113-125 in the *Australian Journal of Basic and Applied Sciences*.
16. Genetic Analysis on *Hibiscus* Species Using RAPD Markers. Kadve S, Yadav M, Tiwari A. 2012;3(6):473-485 in the *International Journal of Biomedical and Advance Research*.
17. Characterization, pollen behavior, and propagation of five selected *Hibiscus* hybrids (*Hibiscus rosa-sinensis* Linn.), San Pascual AO, Magdalita PM, Medina NG, and Apacionado BV. 2017;11(12):1508–1519 in the *Australian Journal of Crop Science*.
18. Review of *Hibiscus rosa sinensis* by Kumar A. and Singh A. 2012;3(2):534-538 in the *International Journal of Research in Pharmaceutical and Biomedical Sciences*.
19. Salem MZM, Salem AZM, and Olivares-Pérez J. A review of studies on the biological processes and phytochemical makeup of *Hibiscus* species. 2014;11(5):1-8 in the *Life Science Journal*.
20. Patel S, Adhav M. Comparative phytochemical analysis of ethanolic extracts of *Hibiscus rosa-sinensis* Linn morphotypes' flowers and leaves. *Journal of Pharmacognosy and Phytochemistry*. 2016;5(3):93– 95.
21. *Hibiscus rosa-sinensis* morphotype flower extracts of different phytochemical elements were analyzed using thin layer chromatography, according to Patel and Adhav. 2016;4(7):13-17. *European Journal of Biotechnology and Bioscience*.
22. Sathe NS, Kadam VJ, Thorat RM, and Jadhav VM. Review of *Hibiscus rosa sinensis* Linn's "Rudrapuspa." 2009;2(7):1168–1173 in *Journal of Pharmacy Research*.
23. Anand A, Sarkar B. Phytochemical screening and antioxidant property of anthocyanins extracts from *Hibiscus rosa-sinensis* . *Applications of Biotechnology for Sustainable Development*. 2017;139–147.
24. Natural dyeing using anthocyanins from *Hibiscus rosa sinensis* flowers. Vankar PS, Shukla D. 2011;122(5):3361-3368 in *Journal of Applied Polymer Science*.

25. **The Phytochemical and Pharmacological Effects of Hibiscus rosa-sinensis: A Review** July 21, 2023 Updated: July 24, 2023 34 Mins Read. Aida Azlina Ali¹, Richard Johari James², Ihsan Safwan Kamarazaman³, Ezza Izzati Zulkurnain¹, Salfarina Ramli², and Hasseri Halim^{2*}

26. Lucky OO, and Kate IE. The effects of aqueous extracts of Linnaeus' leaves on hypertensive rats' renal function. *African Journal of Biochemical Research*.

27. Khristi V, Patel V.. Therapeutic Potential of : a review therapeutic potential of : a review. *Chemistry*. 2017

28. Raduan SZ, Hakim MN. Anti-inflammatory effects of L. and var. alba ethanol extracts. *Int J Pharm Pharm Sci*. 2013;5(4):754-62.

29. R. Ginwala, R. Bhavsar, D. I. Chigbu, P. Jain, and Z. K. Khan. Potential role of flavonoids in the treatment of conditions characterized by chronic inflammation, with apigenin's anti-inflammatory effects gaining special attention. *Basel: Antioxidants*; 2019;8(2):1-30.

30. [May 4 2022]; *Antioxidants: health benefits and nutritional information [internet]*.

31. Free radicals, antioxidants, and functional foods: effects on human health. Lobo V, Patil A, Phatak A, Chandra N. 118–26. *Pharmacogn Rev*. 2010;4(8).

32. Garg D, Shaikh A, Muley A, Marar T.. Array. *Free Radic Antioxid*. 2012;2(3):41-6.

33. Extracts from the flowers of hibiscus (*Hibiscus rosa-sinensis* L.) and cassia (*Senna bicapsularis* L.) have antioxidant and antibacterial properties. Mak YW, Chuah LO, R. Ahmad, and R. Bhat. *King Saud University Journal of Science* (2013), 25, 275–282.

34. Hussein Z, Taher SW, Gilcharan Singh HK, Chee Siew Swee W.. Diabetes care in Malaysia: problems, new models, and solutions. *Ann Glob Health*.. 2015;81(6):851-62

35. an overview of anti-diabetic herbs with insulin-mimetic properties. Patel DK, Prasad SK, Kumar R, Hemalatha Sz. *Asian Pac J Trop Biomed*.

36. Ruban P, Gajalakshmi K.. Array. *Asian Pac J Trop Biomed*. 2012;2(5):399-403.

37. Adhirajan N, Ravi Kumar T, Shanmugasundaram N, Babu M, In vivo and in vitro evaluation of hair growth potential of *Hibiscus rosa-sinensis* Linn, *Journal of Ethno pharmacology*, 2003; 88: 235.

38. Formulation and Evaluation of Herbal Antiacne Face serum. Miss Bhakti Shriram Patil¹, Miss Bhagyashri Govind Patil², Miss. Bhagyashri Sunil patil³, Mr. Amit Dhankani⁴, Dr. S.P. Pawar⁵, 123Student, 4professor, 5principal, P.S.G.V.PMandals college of Pharmacy, India

39. Therapeutic Potential Of *Hibiscus Rosa Sinensis* : A Review . Vincenta khristi and V . H. Patel*

40 . *Hibiscus sabdariffa* L. - a phytochemical and pharmacological review. 2014;165:424–443 in *Food Chemistry*. Bonnlaender B, Da-Costa-Rocha I, Sievers H, Pischel I, and Heinrich M. On <https://europepmc.org/article/med/25038696>

41. Jadhav V, Thorat R, Kadam V, Sathe N, Jadhav V. Traditional medicinal uses of *Hibiscus rosa-sinensis*. *Journal of Pharmacy Research*. 2009 [;2(8):1220-1222. Available from: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.735.2975&rep=rep1&type=pdf>

42. Kolawole J, Maduenyi A. Effect of zobo drink (*Hibiscus sabdariffa* water extract) on the pharmacokinetics of acetaminophen in human volunteers. *Eur J Drug Metab Pharmacokinet* . 2004 ;29(1):25-29. Available from: <https://pubmed.ncbi.nlm.nih.gov/15151167/>

43. Physiological Effects and Human Health Benefits of *Hibiscus sabdariffa*: A Review of Clinical Trials by Efigenia Montalvo – Gonzalez¹ , zuami villagran² , Sughey Gonzalez – Torres² , Laura Elena IniguezMunoz³ , Mario Alberto Isiordia – Espinoza⁴ , Jose Martin Ruvalcaba – Gomez⁵, Ramon Ignacio Arteaga –Garibay⁵ , Jose Luis Acosta⁶ , Napoleon Gonzalez – Silva^{7*}, Luis Miguel Anaya – Esparza^{7*}.

44. A Review : A Pharmacological Review on *Hibiscus Rosa – Sinensis* Akshada D. Dhobale and Nutan S. Wakale Samarth Institute of Pharmacy, Belhe, Mharashtra, India