

Anti-ulcer action of *Hibiscus rosa-sinensis*: review of articles published in 2021.

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Abstract. This mini- review was conducted with the purpose of gathering information, of articles published throughout the year of 2021, about the therapeutic properties that *Hibiscus rosa-sinensis* L. triggers in cases of gastrointestinal ulcers, a disease mainly caused by the bacterium *Helicobacter pylori*. New antibiotics are needed for *H. pylori*, because of the rising antimicrobial resistance that the world is facing right now, and so, medicinal plants are on the scope to solve that matter. The *Hibiscus rosa-sinensis* has presented many therapeutic attributions over the past years, there were antibacterial properties found in the flowers and anti-inflammatory activities in the leaves, with that in mind, this medicinal plant must be a promising way to anti-ulcer treatments. Herbal/ traditional medicine is been widely used in the West Asia for centuries, as for example the Chinese medicine, and now, the Eastern medicine is trying to catch up with this knowledge that can be so enriching, especially if we can substitute the synthetic for the natural. Every year thousands of papers are published on the same subjects, hence the importance of review papers, which study articles on related subjects and make an overview, highlighting some parts of each one.

Keywords. *Hibiscus rosa-sinensis*, ulcer, medical plants, anti-inflammatory potential.

1. Introduction

The use of medicinal plants dates from very remote times, mainly due to the ease of access and variety, this knowledge has been passed on from generations to generations in traditional communities. Developing countries are the ones which most rely on herbal medicine, as for its better acceptance of the general public and the easier access, if compared to highly expensive synthetic drugs. Also, they have presented less side effects [3].

Mostly of this knowledge results in what has become scientific research today, through ethnopharmacological studies.

Originally from China and belonging to the Malvaceae Family, *Hibiscus rosa-sinensis* L. has proven effective against several health disorders. Studies point out that the flower and the leaf have antioxidant, anti-microbial, analgesic and even anticancer actions [1].

Secondary metabolites are substances produced by plants for their own survival, but many of them have high therapeutic potential, as for example, in *H. rosa-sinensis* we have: flavonoids, anthocyanins, quercetin, cyaniding, kaempferol, and hydrocitric acid [2]

Ulcer is defined as a severe inflammation of the gastrointestinal mucosa, having two most common forms: gastric ulcer and the duodenal ulcer.

Infection by the bacterium *H. pylori* is the main cause of this disease, accounting for 90% of the duodenal form and 70% of the gastric ulcer [3].

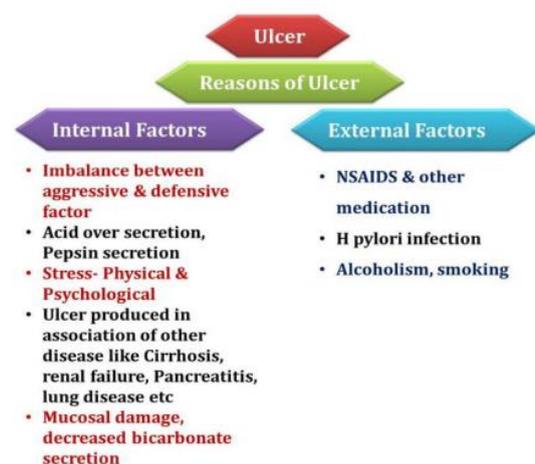


Fig. 1- Reasons of ulcer. Paricharak and Chougule et al. *World Journal of Pharmaceutical Research*. 2021.

This bacterium colonizes the stomach of more than 70% of the world's population, however most of these people are asymptomatic. In 1- 2% of the cases this disease can progress to gastric cancer[5]. The main symptoms are: abdominal discomfort, intolerance to fatty foods, stomach pain and nausea [4].

The method used to treat ulcers is called “quadruple therapy”, which consists of four types of synthetic drugs [3]. But there’s a problem: there has been an alarming increase of antimicrobial resistance (AMR) in *H. pylori*, which directly corresponds to the increase of refractory infections [6], which are the occurrence of the same infection multiple times in the period of six months or less.

2. Methodology

Ethnopharmacology is the practice of combining information acquired in traditional communities with chemical and pharmacological studies carried out in specialized laboratories. It starts with information on the therapeutic utility through traditional communities, and in the laboratories, the effectiveness (or not) of the mechanisms of action are proved.

Many studies have been carried out on the various potential applications of *H. rosa-sinensis*. Considering that this plant has antimicrobial and anti-inflammatory actions, it is a great candidate for ulcer treatment, since this is a disease caused by a bacterium and one of the symptoms is inflammation of the gastrointestinal mucosa.

Through a bibliographical research, in digital platforms, of studies published in the year of 2021, this article gather the ones targeting the ulcer disease being treated with herbal approaches, and what role the *H. rosa-sinensis* were playing.

Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Dilleniidae
Order	Malvaceae
Genus	Hibiscus
Species	<i>Hibiscus rosa sinensis</i>

Table 1- *Hibiscus rosa-sinensis* scientific classification. [1]

3. Results and discussion

There is still no clinical trials in human beings about herbal treatments for erradicating *H. Pylori* or healing ulcer, especially focusing o *H. rosa- sinensis*, so what can be found for the time being is only bibliographic research. Nevertheless, a few In vitro studies were found.

In vitro models are used to measure the efficiency of the antiulcer activity in the chosen plant, one of these studies were about: Methanolic extract of the leaves, at a dose 200 and 400 mg/kg, showed Antiulcer activity in pylorus ligation induced gastric ulcer [4].

3.1 Aplicações por partes do *Hibiscus rosa-sinensis*

Several studies were carried out with diferente parts of *Hibiscus rosa-sinensis*, here are the main

ones that can be related to te treatment of gastrointestinal ulcer:

1. Roots: used as a cough suppressant [1], later on studies showed that the roots were a source of vitamin C [2], so it makes sense that it is used to treat cold symptoms. As for ulcer matter, vitamin C is also responsible for increasing immunity, so it would be harder for the bacteria to spread.
2. Leaves: responsible for anti ulcer activity [4].
3. Flowers: has a greater effect on controlling the blood pressure, so it can be used for heart problems and high blood pressure, it has also been observed Gastroprotectant and antibacterial activities [1].

The red variety is most preferred for medicine porpouses.



Fig. 2- *Hibiscus rosa- sinensis*. Photo from Edgar Okioga on Pexels. No rights reserved.

3.2 Importance of herbal treatments

Researches showed that Antimicrobial resistance (AMR) is a global problem, and this is mainly due to the misuse of antibiotics, from the administration of inappropriate dosages to the recurrent use of this type of medication.

This is a serious matter, because resistance causes antibiotics to be ineffective, causing the person to follow a treatment longer than usual, and so, more time hospitalized and more expensive medicines. Bacterial infections that were easier to treat, now became a global health problem, in which AMR can even increase the death rate of these diseases.

This is where herbal medicine enters, in this case for gastrointestinal ulcer, since the phytotherapy decreases the chances of creating a resistance to *H. pylori* [5].

The next table preset twenty medicinal plants, in addition of the *H. rosa-sinensis*, with antibacterial and antiulcer activities. It is importante to know the wide range we have when talking about herbal medicine. The second table in a row is to get a perspective of how wide is the bibliografical research, how many phytotherapical applications of the *H. rosa -sinensis* have been found so far.

S.No.	Common name	Botanical name	Family	Plant part (Antibacterial)	Plant part (Antitumor)
1	Indian Gum Arabic tree, Babool	Acacia Arabica	Leguminosae	Bark	Seedless pods, gum
2	Bengal quince, golden apple, Japanese bitter orange, stone apple, wood apple, Bacl, Belli	Aegle marmelos L.	Rutaceae	Leaves, bark & fruits	Leaves
3	Garlic, Lissan	Allium sativum	Amaryllidaceae	Bulbs	Bulbs
4	Aloe vera, Gwar Patha, Kurwar Patha	Aloe barbadensis M.	Asphodelaceae (Liliaceae)	Leaves	Leaves
5	Necm	Azadirachta indica	Meliaceae	Leaves	Leaves
6	Indian Barberry, Tree Turmeric, Chitra, Daruharidra	Berberis aristata	Berberidaceae	Stem	Roots & woods
7	Beet root	Beta vulgaris L.	Amaranthaceae	Pomace	Roots
8	Papaya, Papita, Melon tree	Carica papaya	Caricaceae	Leaves	Seeds
9	Peepal, Peepdi	Ficus religiosa	Moraceae	Latex	Leaves
10	Gurhal, China rose, Jasod	Hibiscus rosa sinensis	Malvaceae	Flowers	Leaves
11	Mango, Aam	Mangifera indica	Anacardiaceae	Stem bark	Leaves
12	Sensitive plant, touch me not, Lajjamdi	Mimosa pudica	Fabaceae	Whole plant	Leaves
13	Drumstick tree, Honeradish tree, Senjana, Secng	Moringa oleifera	Moringaceae	Leaves, bark, seed and flesh	Leaves
14	Holi basil, Tulsii	Ocimum sanctum	Lamiaceae	Leaves	Leaves
15	Gale of the wind, Stone breaker, Seed under leaf, Bhuaamla	Phyllanthus niruri	Phyllanthaceae	Leaves	Leaves
16	Black nightshade, Mokoi	Solanum nigrum	Solanaceae	Whole plant	Leaves
17	Tamarind, Imli, Amli	Tamarindus indica	Caesalpinaceae	Stem, bark and leaves	Seeds
18	Myrobalan, Chebulic myrobalan, Harra, Harad, Harde	Terminalia chebula	Combretaceae	Leaves	Fruits
19	False daisy, trailing eclipta, Bhingraj, Kesharaj, Bhingdo	Eclipta alba	Asteraceae	Aerial parts	Whole plant
20	Field mint, Wild mint, Corn mint, Podina, Fadina	Mentha arvensis	Lamiaceae	Leaves	Whole plant

Table 2- Medicinal plants. [3]

Sl no	Part with activity	Activity observed	Author
1.	Leaves	Antioxidant	Alshari et al [8]
2.	Leaves	Antioxidant	Ghaffar et al [9]
3.	Leaves	Antioxidant	Prasad et al [10]
4.	Leaves and stem	Antioxidant	Deepa garg et al [11]
5.	Leaves, stem, root	Antioxidant	Patel et al [12]
6.	Leaves and flowers	Antioxidant	Wong et al [13]
7.	Flower	Antioxidant	Anusha Bhaskar et al [14]
8.	Flower	Antioxidant	Sheth and De et al [15]
9.	Flower	Antioxidant and Anti bacterial	Mak et al [16]
10.	Flower	Antioxidant and Anti bacterial	Zulfiqar Ali Khan et al [17]
11.	Flower	Antioxidant and Antigenotoxic effects	Khatib et al [18]
12.	Flower	Antioxidant and Anti diabetic	Sankaran et al [19]
13.	Leaves	Hypoglycemic and antioxidant	Zaki H et al [20]
14.	Leaves	Antidiabetic	Ojako et al [21]
15.	Leaves	Antidiabetic	Moghal et al [22]
16.	Leaves	Hypoglycemic	A Sachdevan et al [23]
17.	Flowers	Antidiabetic	S Venkitesh et al [24]
18.	Leaves	Diabetes with dyslipidemia	Mamun et al [25]
19.	Flowers	Antidiabetic	Afiune L A F et al [26]
20.	Flowers	Antidiabetic	Petha M et al [27]
21.	Flowers	Antidiabetic	Sharma k et al [28]
22.	Root	Antidiabetic	Kumar V et al [29]
23.	Flower	Gastroprotectant	Kumar et al [30]
24.	Leaves	Ameliorative	Kandhare et al [31]
25.	Flower	Ameliorative effect	Meena et al [32]
26.	Leaves	Renal dysfunction	Kate et al [33]
27.	Leaves	Anti-inflammatory	Raduan et al [34]
28.	Leaves	Anti-inflammatory	Tomar et al [35]
29.	Leaves	Analgesic	Sarvkar et al [36]
30.	Leaves and flowers	Antibacterial	Uddin et al [37]
31.	Leaves and flowers	Antibacterial	Tiwari U et al [38]
32.	Leaves	Antibacterial	Hemarana K et al [39]
33.	Leaves	Antibacterial	Udo IJ et al [40]
34.	Flower	Antibacterial	Ruban et al [41]
35.	Flower	Antibacterial	Agarwal S et al [42]
36.	Leaves	Antifungal	Sanjesh R et al [43]
37.	Flowers	Antifungal	Nilima W et al [44]
38.	Flower	Antihyperlipidemic	Sikarwar et al [45]
39.	Flower	Hepatoprotective effect	Biswas et al [46]
40.	Leaves	Hepatoprotective effect	Sahu CR et al [47]
41.	Flower	Cytotoxic effect	Ali et al [48]
42.	Leaves and stem	Cytotoxicity	Arullappan et al [49]
43.	Leaves	Cardioprotective	Kate I E et al [33]
44.	Flower	Cardioprotective	Khandelval et al [50]
45.	Flower	Cardioprotective	Gauthaman et al [51]
46.	Flower	Immunomodulatory	Desai et al [52]
47.	Flower	Immunomodulatory	Gaur et al [53]
48.	Flower	Antidepressant	Shevale et al [54]
49.	Flower	Antifertility effect	Jana et al [55]
50.	Flower	Antilithiatic	Nirmaladevi et al [56]
51.	Leaves	As coagulant aid	Arwang et al [57]
52.	Leaves	Wound healing activity	Ali A et al [58]
53.	Leaves	Wound healing activity	Mondal S et al [59]
54.	Flower	Wound healing activity	Nayak B S et al [60]
55.	Leaves	Alopecia	Upadhyay et al [61]
56.	Leaves	Hair growth promoter	Pathan A et al [62]
57.	Leaves	Hair growth promoter	N Singh et al [63]
58.	Flowers and leaves	Hair growth promoter	Adhirajan N et al [64]
59.	Leaves	Anticancer	Hinaz N et al [65]
60.	Leaves	Anticancer and antioxidant	Divya N et al [66]
61.	Flowers	Anticancer	Goldberg K et al [67]

Table 3- Pharmacological activity of the H. rosa-sinensis. [1]

4. Conclusion

As previously mentioned, ulcers cause severe inflammation in the gastrointestinal mucosa and therefore, the search for more and new natural treatments is a very viable solution, since it would less attack the mucosa that is already very damaged. On top of that, the use of herbal antimicrobial drugs can work as an escape from de Antimicrobial resistance, due to it's effectiveness and moreover, in comparison to synthetic antibiotics, they have less side effects [3].

A lot of factors can be related to antimicrobial resistance, one of them is the misuse of medications, both when is used for too long and used repeatedly. For gastrointestinal ulcers there is no difference: the World Health Organization (WHO) has listed *H. pylori* as a "priority pathogen" due to the increasing cases of multidrug resistance.

Pharmacists are the health professionals responsible for dispensing medicines. It is known that in certain communities people don't have the same access to information, and the consequence is that they may not know how to correctly use some medications. As for that, it's the pharmaceutical duty to explain in detail how and for how long they are supposed to use the antibiotic, for example, since it could cause refractory infections.

Studies demonstrate that herbal medicine have been more and more accepted by the general public over the years, even though there is still no clinical proof that neither *Hibiscus rosa-sinensis* or any other herbal drug had effect on *Helicobacter pylori* or healed the ulcer, many studies are promising positive results with this and other medicinal plants to treat both *H. pylori* and ulcer.

5. Acknowledgement

The author acknowledges with thanks Federal University of São Paulo for the opportunity and INCBAC Institute for timely support and guidance through the writing process.

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