



Pharmacological Review on *Coccinia grandis* Leaves

Josline Ancita Lobo*, Satish S

Srinivas College of Pharmacy, Farangipete Post, Mangalore, Karnataka, India-574143.

*Corresponding author's E-mail: joslineancitalobo@gmail.com

Received: 18-03-2022; Revised: 15-05-2022; Accepted: 23-05-2022; Published on: 15-06-2022.

ABSTRACT

The leaves of *Coccinia grandis* was used as traditional medicines as household therapy for many diseases in the traditional practice of Indian medicine for the treatment of jaundice, bronchitis, skin eruptions, burns, tongue sores, psychosis, rheumatism, eczema and syphilis. The leaves are used as vegetable by the tribal of Tripura, Mursi tribal of Ethiopia and in Vietnam the leaves and leafy shoots are boiled or cooked in soups. Ivy gourd leafy shoots are rich in beta carotene which has potent antioxidant effects as wells as it ensures the optimal functioning of the heart and prevents heart ailments. Numerous studies on the leaf extract showed pharmacological action such as an antioxidant, antidiabetic, anti-ulcer, anti-inflammatory, antimalarial, antipyretic, analgesic, anthelmintic, antidiabetic, hepatoprotective and antiurolithiatic. In this review an effort is made to focus on the pharmacological action of *Coccinia grandis* leaves.

Keywords: *Coccinia grandis*, Cucurbitaceae, Ivy gourd, Pharmacological action.

QUICK RESPONSE CODE →

DOI:

10.47583/ijpsrr.2022.v74i02.014



DOI link: <http://dx.doi.org/10.47583/ijpsrr.2022.v74i02.014>

INTRODUCTION

The Cucurbitaceae family is commonly acknowledged as gourd, melon or cucurbits and these includes crops like Cucumber, Squashes, Luffas, Melon and Watermelon.¹ The *Coccinia grandis* is the member of Cucurbitaceae family. It is acknowledged as little gourd, baby water melon or tam lueng and also known as Ivy gourd.² It is available in wild form and it is native of Asia, Central Africa and it is distributed in India, Australia, China, Bangladesh, tropical Asia, and Africa.³ *Coccinia grandis* is a dioecious perennial herbaceous vine. It contains several phytoconstituents such as Cephalandrol, Triterpenoid, tannins and alkaloids. It is described as 'Indian substitute for Insulin'.⁴ The leaves exhibit bitter, astringent and cooling effects and it also useful in sores, skin eruption like small pox, skin disease.⁵

Vernacular Names

English: Ivy gourd, Scarlet, Hindi: Kundru, Kannada: Tondekayi, Konkani: Tendli, Tulu: Manoli, Tamil; Kovai, Telugu: Dondakaya, Malayalam: Kovakka, Sanskrit: Tundika, Marathi: Tondli

Synonyms

Coccinia cordifolia, *Coccinia indicia*, *Cephalandra indica*, *Bryonia grandis* L.

Phytochemical Constituents

The leaves of *Coccinia grandis* L. found to have variety of chemical constituents it contains phenolic compounds, flavonoids, saponins and tannins also it contains highest thiamine, riboflavin and niacin.⁶ The ethanolic extract of leaf and aerial part of *Coccinia grandis* contains Cephalandrine A, Cephalandrine B, Cephalandrol, β -sitosterol, and triacontane and the methanolic extract of leaf and aerial part of *Coccinia grandis* contains rutin, quercetin-3-O-neohesperidoside, kaempferol-3-O-rutinoside, kaempferol-3-O-neohesperidoside, kaempferol-3-O-glucoside, kaempferol-hexoside, oleuropein, and ligstroside.⁷ The aqueous extract of fresh leaves of *Coccinia grandis* exhibit anthraquinones in addition to alkaloids, proteins, carbohydrates, tannins, saponins, amino acids, flavonoids, triterpenes, phytosterol. Cephalandrol A and cephalandrol B, sigma-7-en-3-one, taraxerone and taraxerol.⁸

Medicinal Uses

The leaves are used for treating bronchitis, jaundice, burns, skin eruptions, syphilis, gonorrhoea and rheumatism. The leaves are mixed with gingelly oil to treat ring worm, psoriasis and itch. The fresh cotton wad dab in a boiled preparation of crushed, fresh or dried leaves are used to treat snake poison in the eyes.⁶ The leaves are used externally as a poultice in treating skin eruptions.⁸ The leaf juice is applied over the neck and forehead for insomnia, headache, nervous debility, giddiness and it is used as antispasmodic and expectorant and also it is mixed with salt and breast milk which is taken orally to cure eye disease.^{9,10} The decoction of the leaves are used in treatment of cough, jaundice, psychosis.^{11,12,13} The leaf paste is applied all over the body in order to induce perspiration in fever and also applied to skin to treat



scabies, ringworm, psoriasis and itching.¹⁴The leaf extract is used to treat gonorrhoea.¹⁵

Pharmacological Action

Analgesic activity

The methanolic extract of leaves of *Coccinia grandis* exhibited the analgesic activity against acetic acid induced writhing and Hot plate methods in Albino mice and Tail immersion method in Albino rats. Acetic acid causes the algia by liberating the endogenous substances. The methanolic extract of *Coccinia grandis* reduce the complications produced by acetic acid at a dose of 100 and 200mg/kg. The methanolic extract of leaves exhibited the analgesic action may be mediated through peripheral but not central mechanism.¹⁶

Anthelmintic activity

The methanolic leaves extract of *Coccinia grandis* exhibited the significant anthelmintic activity at a dose of 10mg/ml against the *Pheretima posthuma*, *Taeniasolium* and *Ascaris Lumbricoides*.The methanolic extract of *Coccinia grandis* acts through paralyzing the worm. The activity is measured by the time taken to paralyzing the worm and death. The extract caused paralysis followed by death of all selected worms at the selected concentrations.¹⁷

Anti bacterial activity

The aqueous extract of *Coccinia grandis* leaves exhibited the antibacterial activity against *Escherichia coli*, *Salmonella choleraesuis-36*, *Shigella flexneri N1CED*, *Shigella flexneri E03429*, *Shigella dysenteries*, and *Bacillus subtilis UC-564*. Study revealed that the aqueous extract of *Coccinia grandis* leaves have more significant antibacterial activity than the ethanol extract. The antibacterial property is due to the polar moiety of the extract.¹⁸

Antidiabetic activity

The methanolic polyherbal extract of leaves of *Coccinia grandis* showed antidiabetic activity against streptozotocin induced diabetics in rats. Diabetic rats in different groups received treatment with two concentrations of the extract (150 and 300 mg/kg, p.o.) with standard drug and saline, under similar conditions, when comparable to glibenclamide after 10 days of treatment there is significant reduction of elevated blood sugar level. The results showed that the polyherbal extracts of leaves of *Coccinia grandis* shows distinct antidiabetic property.¹⁹

Anti-inflammatory activity

The aqueous extracts of *Coccinia grandis* leaves and stem exhibited the anti-inflammatory activity against formaldehyde induced paw edema in rats. The formaldehyde causes acute inflammation which results from the cell damage and which provokes the production of endogenous mediators such as prostaglandins, bradykinin, histamine, and serotonin. The aqueous extract of leaves showed more significant percentage inhibition of

paw edema than the aqueous extract of the stem and standard used as indomethacin.²⁰

Anti-malarial activity

The aqueous leaf extract of *Coccinia grandis* exhibited the anti-malarial activity. Aqueous leaf extract of *Coccinia grandis* decreases the SGPT, SGOT, ALP, total protein, blood urea nitrogen concentration. Hydrophilic moiety of *Coccinia grandis* extract is responsible for antimalarial activity. The extract significantly reduces the *Plasmodium berghei* parasite strength in mice.²¹

Antioxidant activity

The fractions of the hydro methanolic extract of leaves of *Coccinia grandis* was evaluated for the antioxidant using nine invitro assays. The fraction of leaf extract showed strong antioxidant activity, metal chelating ability, reducing power ability, inhibition of β -carotene bleaching and free radical scavenging activity when compared to standards such as α -tocopherol, curcumin, ascorbic acid, and butylated hydroxytoluene. The antioxidant activity and free radical scavenging may be attributed to the presence of flavonoid and phenolic compounds present in the fractions.²²

Antipyretic activity

The methanolic extract of leaves of *Coccinia grandis* exhibited the antipyretic activity at the doses of 100 and 200 mg/kg in yeast-induced pyrexia in rats thus the extract showed antipyretic activity by influencing the prostaglandin biosynthesis. Prostaglandin is considered as a regulator of body temperature. The antipyretic agents exhibit the drug action by inhibiting COX-2 expression and thus inhibiting the prostaglandin synthesis to reduce the elevated temperature.¹⁶

Antiulcer activity

The aqueous extract of leaves of *Coccinia grandis* exhibited anti-ulcer activity against pylorus ligation and ethanol induced ulcer models in rats. Ulcer index was determined in both models. The aqueous extract of *Coccinia grandis* at doses of 250 and 500 mg/kg produced significant inhibition of the gastric lesions induced by pylorus ligation induced ulcer and ethanol induced gastric ulcer. The aqueous extract reduced the gastric volume, total acidity, free acidity and ulcer index thus showing the anti-secretory mechanism involved in the extract for their anti-ulcerogenic activity.²³

Antirolithiatic activity

The hydro alcoholic leaf extract of *Coccinia grandis* showed antirolithiatic property against ammonium chloride and ethylene glycol induced urolithiasis in rats. Hydro alcoholic leaf extract reduced the urinary calcium, phosphate, oxalate, uric acid and creatinine by increasing the urine volume, reduce the tendency of crystallization. Histopathological study showed the lithiatic confirmation of micro crystals deposition in kidney section of ethylene



glycol treated animals, leaf extract treatment reduced this crystals deposition.²⁴

Hepatoprotective activity

The diethyl ether extract of leaves of *Coccinia grandis* exhibited the hepatoprotective activity against liver toxicity induced by carbon tetrachloride in rats at a dose of 400 mg/kg body weight and it was comparable with a standard hepatoprotective silymarin at 125mg/kg body weight. The diethyl ether extract treated rats showed reduced SGPT, SGOT level and hepatic damage.²⁵

CONCLUSION

Coccinia grandis has been used in traditional medicine as a household remedy for various diseases. The leaves of *Coccinia grandis* have good medicinal values in traditional system of medicines. *Coccinia grandis* have beneficial effect for food and/or nutritious application in the promotion of health. It can be concluded that *Coccinia grandis* is an important source of many pharmacological and medicinally important chemicals. The studies have revealed that the leaf of the plant has exceptional medicinal properties compared to any other parts. From the above discussion, it is cleared that *Coccinia grandis* can compete existing medicines to cure some critical diseases as well.

REFERENCES

1. Pekamwar SS, Kalyankar TM, Kokate SS. Pharmacological activities of *Coccinia grandis*. J Appl Pharm Sci. 2013; 3(05):114-119.
2. Mathews MM, Sunny B. A compendious write-up on *Coccinia grandis*. Int j Pharm Sci Rev Res. 2019; 54(2):29-36.
3. Sikta SA, Mahub J, Mou RA, Trisha KT, Dash PR. Ethnomedical profile of different parts of *Coccinia cordifolia*: A review. Int j Med Health Res. 2018; 4(2):130-136.
4. Amin M, Rao AVDD, Kumar KR, Suneetha DRS. Culture Establishment of *Coccinia grandis* (L) through nodal segments under in vitro conditions. Int j currmicro boil appl sci. 2020; 9(7): 2273-2286.
5. Jamwal A, Kumar S. *Cephalandra indica* Naud.-A Review. Indian J Res Pharm Biotechnol.2015; 3:256-284.
6. Lim TK. *Coccinia grandis*. In Edible Medicinal and Non-Medicinal plants. Dordrecht; Springer. 2012; 191-200.
7. Putra IM, Fakhrudin N, Nurrochmad A, Wahyuono S. Antidiabetic activity of *Coccinia grandis* (L.) Voigt: Bioactive constituents, mechanisms of action, and synergistic effects. J Appl Pharm Sci. 2022; 12(01):41-54.
8. Gautam S, Meshram A, Srivastava N. A brief study on phytochemical compounds present in *Coccinia cordifolia* for their medicinal, pharmacological and industrial applications. World J Pharm Pharmaceutical Sci. 2014; 3:1995-2016.
9. Rajesh P, Sumathi V, Viswanathan S. An ethnobotanical survey of medicinal plants in Cuddalore district. Inter J Adv Res Dev.2018; 3(10):14-22.
10. Khare CP. *Coccinia grandis*. In Indian medicinal plants: an illustrated dictionary. Dordrecht; Springer. 2007; 162.
11. Nath V, Buragohain P, Sharma HK. A review on some medicinal plants of northeast india used in the treatment of respiratory disorders. Curr Trends PharmaRes.2021; 8(1): 158-191.
12. D Dipankar, Datta BK, Debbarma J, Deb S. Ethnomedicinal plants used for herbal medication of jaundice by the indigenous community of Tripura, India. Biodiversitas. 2016;17(1): 256-259.
13. Ahmed M, Azam K, Nur M. Traditional knowledge and formulations of medicinal plants used by the traditional medical practitioners of Bangladesh to treat schizophrenia like psychosis. Schizophr Res Treat. 2014: DOI :679810.
14. Das D, Devi KP, Asha S, Asha S, Maheswar T. Ethnomedicinal review of the plant *Coccinia indica* (Bimbi) and its utilization in India. Int Ayurvedic med j. 2019; 7(8): 1399-1402.
15. Varuna V. *Coccinia grandis* (L) Voigt-review. World J. Pharm. Res. 2018 ;7(12):188-200.
16. Aggarwal AS, Suralkar UR, Chaudhari SG, Deshpande SV, Garud AA, Talele SG. Analgesic and antipyretic activity of methanolic extract of *Coccinia grandis* L. Leaves in experimental animals. Res J Pharm Bio Chem Sci. 2011; 2:175-182.
17. Dewanjee S, Maiti A, Kundu M, Mandal SC. Evaluation of anthelmintic activity of crude extracts of *Diospyros peregrina*, *Coccinia grandis* and *Schima wallichii*. Dhaka Univ j Pharm Sci. 2007; 6(2):121-123.
18. Bhattacharya B, Samanta M, Pal P, Chakraborty S, Samanta A. In vitro evaluation of antifungal and antibacterial activities of the plant *Coccinia grandis* (L.) Voigt. (Family-Cucurbitaceae). J Phytol. 2010; 2(11):52-57.
19. Ghosh S, Roy T. Evaluation of antidiabetic potential of methanolic extract of *Coccinia indica* leaves in streptozotocin induced diabetic rats. Int J Pharm Sci Res. 2013; 4(11):4325-4328.
20. Deshpande SV, Patil MJ, Daswadkar SC, Suralkar U, Agarwal A. A study on anti-inflammatory activity of the leaf and stem extracts of *coccinia grandis* L. voigt. Int j appl boil pharm. 2011; 2: 247- 250.



21. Samanta A, Bhattacharya B, Ghosh S, Das G. In vivo antimalarial activity of the plant *Coccinia grandis*. Int j pharm res dev.2011; 3:73-9.
22. Umamaheswari M, Chatterjee TK. In vitro antioxidant activities of the fractions of *Coccinia grandis L.* leaf extract. Afr j Trad Complement Altern Med. 2008; 5(1):61-73.
23. Girish C, Balakrishnan S, Koner BC, Jayanthi S, Rao KR, Rajesh B, Pradhan SC. Evaluation of antiulcer activity of *Coccinia grandis* leaves. Res J Pharmacol Pharmacodyn. 2011; 3:2011-2013.
24. Manimala M, Atlee WC, Mohamed AS, Maduravoyal C. Effect of *Coccinia grandis* on ammonium chloride and ethylene glycol induced urolithiasis in rats. Int. J. Drug Dev. & Res.2014; 6(3):138-146.
25. Kumar BS, Gnanasekaran D, Jaishree V, Channabasavaraj KP. Hepatoprotective activity of *Coccinia indica* leaves extract. Int J Pharm Biomed Res. 2010; 1(4):154-156.

Source of Support: The author(s) received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

For any question relates to this article, please reach us at: globalresearchonline@rediffmail.com
New manuscripts for publication can be submitted at: submit@globalresearchonline.net and submit_ijpsrr@rediffmail.com

