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# Phytochemical screening and antioxidant investigations on *Ixora coccinea* flowers

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**Abstract**
*Ixora coccinea* Linn., an evergreen shrub that is native to India and is a member of the Rubiaceae family, is sometimes referred to as the "jungle of geranium" and red ixora. The flowers, leaves, roots, and stems are used in the Indian Traditional Medical System, or Ayurveda, and in many folk medicines to treat a variety of illnesses. The current study provides some insight into the antioxidant properties of several *Ixora coccinea* plant extracts. *Ixora coccinea* flowers were extracted using a solvent with increasing polarity (petroleum ether, chloroform, ethyl acetate, and methanol), and several extracts were examined for antioxidant and phytochemical properties.
As a result of this investigation, phytochemicals including flavonoids (12.90%), saponins (10.95%), tannins (13.84%), alkaloids (10.04%), glycosides (0.99%), and phenols (4.99%) were detected in the methanolic extracts of *Ixora coccinea* flowers. When the extracts were concentrated to 400 µg/ml, the ethyl acetate and methanolic ones demonstrated notable antioxidant activity. Additionally, the presence of phenolic chemicals may be the reason for the antioxidant activity demonstrated by the various extracts. In general, the pharmacological effects stated earlier were successfully imparted by *Ixora coccinea* extracts in methanol and ethyl acetate.

**Keywords:** *Ixora coccinea*, flowers, qualitative phytochemical screening, antioxidant activity, DPPH assay

## Introduction
Because medicinal plants have such great therapeutic value, they are the oldest source of critical medicines for treating human ailments. The medicinal plants hold a very significant position as raw materials for essential pharmaceutical applications. They include phytoconstituents that are used to treat a variety of human illnesses. Many diseases can be effectively treated by environmentally produced optional metabolites, of which plants are thought to be a plentiful supply. Multiple drug resistance is a major issue in pharmacotherapeutics that is starting to emerge. However, it is thought that antibacterial compounds are abundant in therapeutic plants [1]. Thus, there is a lot of attention being given to the phytochemical assessment of various plant species for therapeutic purposes.
It has been stated that the tiny shrub *Ixora coccinea* Linn (Rubiaceae), which is grown all throughout India, offers several medicinal benefits [2]. *Ixora coccinea* Linn is a thick, multi-branched, evergreen shrub that grows to a height of 12 feet (3.6 meters) but is typically 4-6 feet (1-2-2 meters) tall. *Ixora coccinea* Linn is referred to as "pokok Tudung Periuk" in Malay. *Ixora coccinea* Linn has been shown to have traditional medicinal uses for a variety of conditions, including hepatoprotective, chemoprotective, antibacterial, antioxidant, antinociceptive, and anti-inflammatory properties [3]. Furthermore, *Ixora coccinea* Linn is used as a mouthwash in Myanmar and is said to be beneficial in treating dental illnesses and toothaches [4]. *Ixora coccinea* Linn root has been used to treat diarrhea, fever, chronic ulcer, anorexia, stomach ulcers, lesions, and nausea [2, 5].

## Materials and Methods
### Plant sample
Fresh flowers of *I. coccinea* was collected in February, 2024, from Dapoli Tahasil, Maharashtra and the plant species was authenticated in the Department of Botany, Dapoli Urban Bank Senior Science College, Dapoli.

### Extraction of crude extracts
Fresh flowers were washed thoroughly with water to remove the earthy matters and freed from debris. And subjected to solvent extractions using petroleum ether, chloroform and methanol etc. Extracts were stored in refrigerator for further analysis.

### Phytochemical Screening
Phytochemical analysis was conducted using the method described by Roghini and Vijayalakshmi (6) slightly modified to determine the presence of secondary metabolites in *Ixora coccinea*.
**Saponin:** In a test tube, 1 ml of plant extract was diluted with distilled water and agitated for 15 minutes. A 1 cm layer of foam formed when saponins were present.

**Flavonoids:** 2-3 drops of sodium hydroxide solution were added to 1 mL of plant extract. The presence of flavonoids was revealed by the production of an acute yellow color.

**Phenols:** 1 ml of the extract was mixed with 1 ml distilled water and a few drops of 10% ferric chloride. The presence of phenols was revealed by the formation of a blue tint.

**Tannins:** 2 ml ferric chloride (5%) was added to 1 ml of extract. Tannins were detected by the formation of a dark blue black.

**Alkaloids:** 2 mL strong hydrochloric acid was applied to 2 mL extract. The Salkowski reagent was then added in three drops. The presence of alkaloids was revealed by the presence of white precipitate.

**Glycosides:** 2 mL extract, 3 mL chloroform, and 10% ammonia solution were added to 2 mL extract. The inclusion of glycosides was shown by the formation of a pink color.

### Antioxidant assessment

### Diphenyl-1-picrylhydrazyl radical scavenging assay

Using the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) method as outlined by Dey and Ghosh, different extracts were subjected to the DPPH free radical scavenging test [7]. First, a 0.1 mM DPPH solution in methanol was created. Samples of extracts at different concentrations (50, 100, 200, 400, 600, 800, and 1000 µg/ml) were created using the same solvent. Ascorbic acid was utilized as a quality standard at different concentrations (50, 100, 200, 400, 600, 800, and 1000 µg/ml) for the antioxidant assay. Additionally, 1 ml of DPPH solution was added to 3 ml of standard or distinct extracts (methanol, ethanol acetate, petroleum ether, and chloroform) in methanol at the previously specified concentrations. In a similar manner, the positive control was prepared without any samples. After vigorously stirring the reaction mixture, it was kept at room temperature for 30 minutes in a darkened environment until the reaction was finished. Five hundred and seventeen nanometers of absorbance were measured using an ultraviolet (UV) spectrophotometer.

## Results

### Qualitative and quantitative phytochemical screening

The primary phytoconstituents found in each extract were identified through screening. The methanolic extract has higher concentrations of flavonoids, phenolic compounds, and other substances, based on the early phytochemical screening results. Table 1 listed the phytoconstituents found in each extract. Specific combinations of phytochemicals, or secondary metabolites, found in plant extracts may have additional medicinal effects.

The amount of each phytochemical examined for in the flowers, expressed as a percentage, is displayed in Table 2. Research has demonstrated that tannins possess antioxidant properties, encourage the healing of damaged tissue, have anti-H. pylori properties, and play a role in reducing inflammation in the gastrointestinal tract.

**Table 1:** Preliminary qualitative analysis of phytochemicals present in *I. coccinea* flowers

| Chemical Components | Petroleum ether | Chloroform | Ethyl acetate | Methanol |
|---|---|---|---|---|
| Steroids | + | + | ND | + |
| Alkaloids | ND | ND | + | + |
| Tannins | ND | ND | ND | + |
| Glycosides | ND | ND | + | + |
| Saponins | ND | + | ND | + |
| Flavonoids | ND | + | + | + |
| Triterpenes | + | + | + | + |
| Carbohydrates | ND | + | + | + |

+: Presences of compounds, ND: Not detected

**Table 2:** Quantitative analysis of phytochemicals present in *I. coccinea* flowers

| Compound | Amount in % |
|---|---|
| Alkaloids | 10.04 |
| Tanins | 13.84 |
| Flavonoids | 12.90 |
| Phenol | 4.99 |
| Saponin | 10.95 |
| Glycosides | 0.99% |

### Antioxidant assessment of *Ixora coccinea* extracts

### Diphenyl-1-picrylhydrazyl radical scavenging assay

When the antioxidant is present with the DPPH in the DPPH scavenging assay, a color shift occurs, turning the purple DPPH into a yellow substance. The deeper the yellow color of DPPH, the more striking the antioxidant activity of the extract that has been investigated. The reaction among the DPPH and the antioxidant test molecule leads to the formation of a stable complex which gives the color. The standard ascorbic acid expressed 96.24% prohibition at a concentration of 1000 ppm, while Petroleum ether disclosed 80.11. The extracts with petroleum ether and chloroform expressed a relatively lower percentage of inhibition. The percentage of inhibition for the extracts and the standard data are compiled in Table 3.

**Table 3:** DPPH free radical scavenging potential of *Ixora coccinea* flowers

| Concentration (ug/ml) | Ascorbic acid | Petroleum ether | Chloroform | Methanol | Ethyl acetate |
|---|---|---|---|---|---|
| 50 | 46.77 | 8.36 | 9.98 | 7.12 | 8.64 |
| 100 | 61.98 | 22.18 | 10.27 | 24.45 | 21.23 |
| 150 | 72.33 | 32.87 | 22.18 | 35.43 | 33.42 |
| 200 | 89.67 | 56.34 | 34.56 | 62.46 | 58.97 |
| 400 | 93.12 | 62.31 | 54.13 | 74.32 | 68.87 |
| 800 | 95.56 | 76.12 | 78.82 | 81.23 | 79.09 |
| 1000 | 96.24 | 80.11 | 90.12 | 92.76 | 88.54 |

## Discussion

The present investigation involved the screening of phytochemicals from various parts of *Ixora coccinea*. The results indicated the presence or absence of flavonoids, phenols, tannins, alkaloids, and glycosides. The leaves did not contain any saponins, but the stem contained all of the aforementioned compounds along with phenols, tannins, alkaloids, and glycosides. All of the phytochemicals under investigation were, nevertheless, present in the flowers, which is consistent with the findings of [6]. Since tannin was

the most prevalent compound, the antiulcer property shown was not surprising. Tannins have been demonstrated to have anti-inflammatory properties in the gastrointestinal system, to support tissue healing, to have antioxidant activity, and to have anti-Helicobacter pylori actions. This research and a number of experimental models of stomach ulcers are comparable to those of De Jesus *et al*. (2012) [8]. It has also been demonstrated that tannins play a role in the healing of stomach ulcers. Both the presence and amount of tannins in the *Ixora coccinea* flower can account for its anti-ulcer properties. Methanol and ethyl acetate extracts of *Ixora coccinea* shown promising antioxidant activity compared to ascorbic acid as a standard. Antioxidant potential was evaluated by DPPH and the Reducing power method. Thus, from the above study, we can conclude both of these extracts are having antioxidant potential.

It can be concluded from this research that the phytochemical screening of *Ixora coccinea* was achieved the using the different extract. The flowers revealed more of the phytochemicals such as flavonoid, saponin, tannin, alkaloid, glycoside, phenol and used to carry out the research. Other parts of *Ixora coccinea* should be investigated further as it possesses phytochemicals. Further work is suggested to check the cytotoxicity properties of the phytochemicals should be investigated.

**References**


1. Katerere DR, Luseba D. Methods for Evaluating Efficacy of Ethnoveterinary Medicinal Plants Katerere DR, Luseba D. Ethnoveterinary Botanical Medicine: Herbal Medicines for Animal Health. Boca Raton, USA: CRC Press, 2010.
2. Maniyar Y, Bhixavatimath P, Agashikar N, Antidiarrheal activity of flowers of Ixora coccinea Linn. in rats. Journal of Ayurveda and integrative medicine, 1(4), 287.
3. Vadivu R, Jayshree N, Kasthuri C, Rubhini K, Rukmankathan G, Pharmacognostical standardization of leaves of Ixora coccinea Linn. J Pharm Sci Res, 2, 164-170.
4. Than MA, Oo MW, Hla TH, Than A, Tut T, Lwin MT. Anti inflammatory and antiplaque activity of Ponna yeik (Ixora coccinea Linn.) leaves extract used as a mouthwash on chronic gingivitis patients. Myanmar Health Sciences Research Journal,2009:21(1):26-31.
5. Elumalai A, Eswaraiah C, Venkatesh Y, Narendar C. Phytochemical and pharmacological profile Of Ixora coccinea Linn. International Journal of Pharmacy & Life Sciences, 3(3).
6. Roghini R, Vijayalakshmi K. Phytochemical screening, quantitative analysis of flavonoids and minerals in ethanolic extract of citrus paradisi. JPSR,2018:9:4859-4864
7. Dey S, Ghosh M. A LC/MS-MS Guided Isolation of laccaic acid-A: A potent antimicrobial agent. Indian J Pharm Educ,2018:52:S287–95.
8. De Jesus NZ, De Souza, Falcão H, Gomes IF, *et al*. Tannins, peptic ulcers and related mechanisms. Int J Mol Sci,2012:13:3203-3228.