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# Phytochemical characterization, antioxidant potential, and cytotoxic activity of *Erythrina variegata* leaf extract an integrated spectroscopic and bioassay approach

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**Abstract**
The present study investigated the phytochemical composition, antioxidant potential and cytotoxic activity of *Erythrina variegata* leaf extract through integrated spectroscopic and bioassay approaches. Preliminary phytochemical screening revealed the presence of flavonoids, phenolic, and other bioactive compounds, as confirmed by UV-Visible and FT-IR spectroscopic analysis. The extract exhibited significant dose-dependent antioxidant activity in multiple assay systems, demonstrating potent free radical scavenging capacity against DPPH (2, 2-diphenyl-1-picrylhydrazyl) assay ($IC_{50}$ = 42.2 µg/mL), superoxide ($IC_{50}$ = 48.52 µg/mL), and nitric oxide ($IC_{50}$ = 49.93 µg/mL) radicals, with performance comparable to ascorbic acid standards. Notably, the extract showed strong iron chelating ability (80.23% at 80 µg/mL), suggesting potential in mitigating metal-induced oxidative stress. Cytotoxicity evaluation revealed concentration-dependent growth inhibition in human cancer cell lines, with an $IC_{50}$ of 185.15 µg/mL, while maintaining relatively low toxicity at concentrations below 50 µg/mL. These findings highlight *E. variegata* as a promising source of natural antioxidants with selective cytotoxic properties, warranting further investigation into its bioactive constituents and potential therapeutic applications. The study provides scientific validation for the traditional use of this plant and suggests its potential as a dual-function agent in oxidative stress management and cancer therapy.

**Keywords:** *Erythrina variegata*, antioxidant activity, cytotoxic activity, phytochemical analysis, free radical scavenging

## 1. Introduction
Oxidative stress, resulting from an imbalance between reactive oxygen species (ROS) production and cellular antioxidant defenses, plays a critical role in the pathogenesis of numerous chronic diseases, including cancer, neurodegenerative disorders, and cardiovascular conditions [1]. The search for natural antioxidants as alternatives to synthetic compounds has gained significant attention due to their potential health benefits and reduced side effects [2]. *Erythrina variegata*, a medicinal plant belonging to the Fabaceae family, has been traditionally used in various ethno medicinal practices for its anti-inflammatory, antimicrobial, and analgesic properties [3].
Recent studies have highlighted the presence of bioactive phytochemicals, such as flavonoids, alkaloids, and phenolic compounds, in *E. variegata*, which are known for their antioxidant and anticancer activities [4]. However, a systematic evaluation of its free radical scavenging potential and cytotoxic effects remains underexplored. UV-Vis and FT-IR spectroscopy serve as powerful tools for preliminary phytochemical characterization, enabling the identification of functional groups responsible for these biological activities [5-7].
*In vitro* antioxidant assays, including DPPH, superoxide, and nitric oxide scavenging tests, provide insights into the extract's ability to neutralize free radicals, while cytotoxicity assays assess its potential as an anticancer agent [8].Plant-derived therapeutics, this study aims to comprehensively evaluate the antioxidant and anticancer properties of *E. variegata* leaf extract through spectroscopic and bioactivity analyses, contributing to the growing body of knowledge on natural alternatives for disease prevention and treatment[9].

## 2. Materials and Methods
**2.1 Plant material extraction:** Fresh leaves of *Erythrina variegata* were collected, authenticated by authentication from Rabinet Herbarium, Tiruchirappalli.

Shade-dried and pulverized. The powder (500 g) was subjected to maceration with 70% ethanol (1:10 w/v) for 72 hours, filtered, and concentrated under reduced pressure (40 °C) to yield a crude extract (yield: 12.8%). The extract was stored at 4 °C until use. Fresh leaves of *Erythrina variegata* were collected, authenticated by authentication from Rabinet Herbarium, Tiruchirappalli. Shade-dried and pulverized. The powder (500 g) was subjected to maceration with 70% ethanol (1:10 w/v) for 72 hours, filtered, and concentrated under reduced pressure (40 °C) to yield a crude extract (yield: 12.8%). The extract was stored at 4 °C until use.

### 2.2. Phytochemical Characterization

#### 2.2.1 UV-Visible Spectroscopy of *Erythrina variegata*

The extract (1 mg/mL in methanol) was scanned from 200-800 nm (Shimadzu UV-1800) to detect phenolic/flavonoid absorption peaks [10].

#### 2.2.2 FT-IR Analysis of *Erythrina variegata*

The extract was mixed with KBr and pressed into pellets. Spectra were recorded (400-4000 $cm^{-1}$) using a PerkinElmer FT-IR spectrometer to identify functional groups [11].

### 2.3. *In vitro* antioxidant assays of *Erythrina variegata*

#### 2.3.1 DPPH (2, 2-diphenyl-1-picrylhydrazyl) assay) radical scavenging of *Erythrina variegata*

The DPPH radical scavenging activity of *Erythrina variegata* extract was evaluated using a standardized protocol. Test solutions containing the extract at concentrations ranging from 20 to 80 µg/mL were prepared and mixed with 0.1 mL DPPH methanolic solution in equal volumes (1:1 ratio). The reaction mixtures were incubated in darkness for 30 minutes at room temperature to allow complete radical scavenging activity. Following incubation, the absorbance of each solution was measured at 517 nm using a UV-Visible spectrophotometer, with methanol serving as the blank.

The percentage inhibition of DPPH radicals was calculated using the formula:

$$\% \text{ Inhibition} = [(A_0-A_1)/A_0] \times 100$$

Where $A_0$ represents the absorbance of the DPPH control (without extract) and $A_1$ denotes the absorbance of the test sample [12].

#### 2.3.2 Superoxide scavenging activity of *Erythrina variegata*

Superoxide scavenging**,** the method of were adapted using a NADH/PMS/NBT system. Briefly, reaction mixtures containing 0.1 mL of extract (20-80 µg/mL), 0.5 mL nitrobluetetrazolium (0.1 mM), 0.5 mL NADH (0.1 mM), and 0.1 mL phenazinemethosulfate (60 µM) in phosphate buffer (pH 7.4) were incubated at 25 °C for 5 min. Absorbance was measured at 560 nm against appropriate blanks [13].

#### 2.3.3 Iron chelating activity of *Erythrina variegata*

The iron chelating activity of *Erythrina variegata* extract was evaluated using the ferrozine assay, where 0.5 mL of extract (20-80 µg/mL) was mixed with 0.05 mL $FeCl_2$ (2 mM) and 0.1 mL ferrozine (5 mM). After 10 minutes of incubation, the absorbance was measured at 562 nm to assess iron-chelating capacity. The percentage chelation was calculated as $[(A_0-A_1)/A_0] \times 100$, where $A_0$ is the control absorbance (without extract) and $A_1$ is the test sample absorbance. The assay demonstrated the extract's ability to bind free ferrous ions, suggesting its potential in mitigating metal-induced oxidative stress [14].

### 2.4. Cytotoxicity assay (MTT) of *Erythrina variegata*

The anticancer potential of *Erythrina variegata* extract was assessed using human breast cancer cells (MCF-7) cultured in DMEM supplemented with 10% fetal bovine serum (FBS). Cells were treated with varying concentrations of the extract (12.5-400 µg/mL) for 24 hours, followed by incubation with MTT reagent (0.5 mg/mL) for 4 hours to allow Formosan crystal formation. The crystals were solubilized in DMSO, and absorbance was measured at 570 nm to determine cell viability [15].

$$\text{Viability\% Viability} = (A_{test}/A_{Control}) \times 100$$

### 2.5. Statistical Analysis

In this study, all measurements were repeated three times, and the average value along with the standard deviation (SD) is reported (Mean ± SD). To determine the concentration at which a substance inhibits a biological process by 50% (IC-50), we used Graph Pad Prism software (version 9.0). Statistical significance of the results was determined using a one-way ANOVA test, with a p-value less than 0.05 considered significant.

## 3. Results and Discussion

### 3.1 UV-visible spectroscopy of *Erythrina variegata*

The accompanying peaks in the spectrum the first at 222.35 nm with a high absorbance of 4.000 AU, the second at 325.70 nm with an absorbance of 1.176 AU, and the third at 664.50 nm with a much lower absorbance of 0.069 AU. No valley data is provided, indicating either incomplete analysis or that valleys were not the focus of the study.

UV-visible spectroscopy can be performed for qualitative analysis and for identification of certain classes of compounds in both pure and biological mixtures. Preferentially, UV-visible spectroscopy can be used for quantitative analysis because aromatic molecules are powerful chromospheres in the UV range [16].

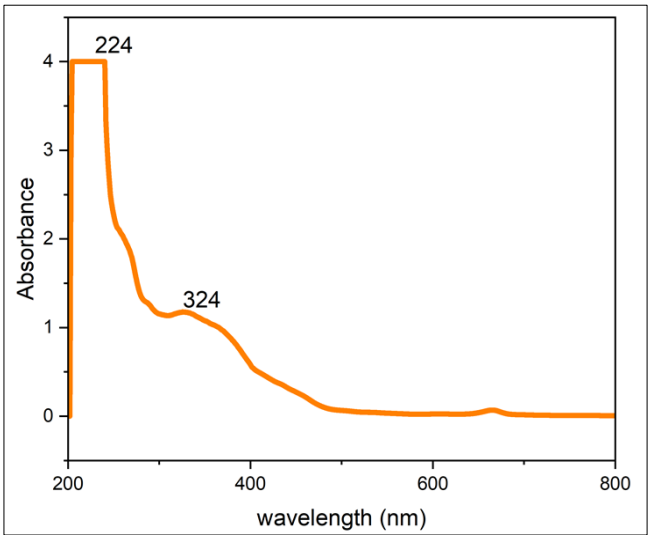


**Fig 1:** UV-visible spectroscopy of *Erythrina variegata* leaves extract

The strong absorbance at 222.35 nm suggests significant activity in the UV region, which is common Phenolic compounds are naturally occurring molecules. The peaks at 325.70 nm and 664.50 nm extend into the visible range,

hinting at additional electronic transitions or scattering effects.

### 3.2 FT-IR Spectroscopy of *Erythrina variegata*

The spectrum reveals key absorption bands, including strong signals observed at 2922.12 $cm^{-1}$ and 2850.34 $cm^{-1}$, characteristic of C-H stretching vibrations commonly found in aliphatic hydrocarbons. The peak at 1928.91 $cm^{-1}$ is less typical and may represent overtone or combination bands. Additional notable absorptions appear at 1394.22 $cm^{-1}$ and 1072.11 $cm^{-1}$, likely associated with C-O or S=O stretching vibrations, which could indicate the presence of alcohols, ethers, or sulfoxides.

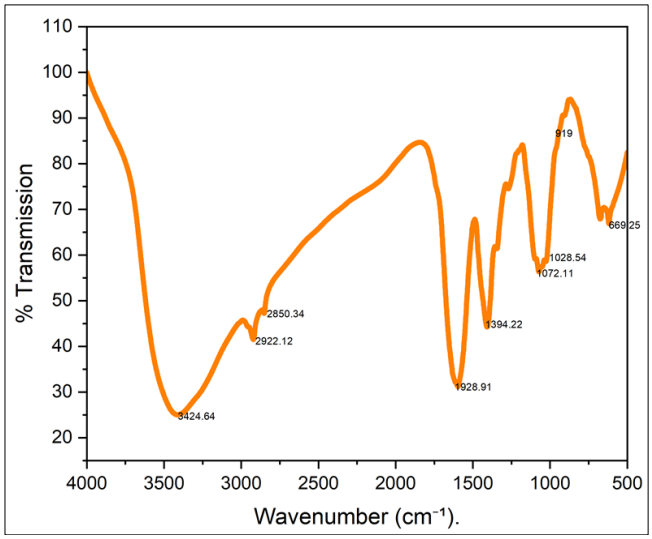


**Fig 2:** FT-IR Spectroscopy of *Erythrina variegate* leaves extract

The band at 1028.54 $cm^{-1}$ may correspond to C-O-C stretching, often seen in ethers or polysaccharides, while the peak at 919 $cm^{-1}$ could suggest C-H bending or metal-oxygen bonds. The FT-IR spectrum of plants extract indicates the presence of functional groups with corresponding absorbance frequencies ($cm^{-1}$.) *viz* Alcohols, Phenols (3367.74, O-H Stretching, H-Bonded), Alkanes (2901.56, 2976.23, C-H Stretching), Alkenes (1655.77,-C=C-Stretching), Aromatics (1452.46, 1407.66, C-C Stretching (In-Ring), Aliphatic Amines (1080.91, 1051.05, C-N Stretching) and 1˚, 2˚ Amine (669.25, N-H Wag) [11].

### 3.3 The DPPH antioxidant activity of *Erythrina variegata*vs. Ascorbic Acid

The data compares the antioxidant activity of *Erythrina variegata* extract with standard ascorbic acid across a concentration range of 20-80 µg/ml. Both substances demonstrate clear dose-dependent antioxidant behavior, with inhibition percentages increasing steadily at higher concentrations. At 80 µg/ml, *E. variegata* accomplishes 85.61% inhibition compared to ascorbic acid's 96.45%, showing remarkably similar efficacy. The $IC_{-50}$values further confirm this similarity, with *E. variegata* (42.2 µg/ml) performing nearly identically to the standard antioxidant (40.2 µg/ml). These results strongly suggest that *E variegata* extract contains potent antioxidant compounds that could serve as effective natural alternatives to synthetic antioxidants like ascorbic acid. The marginal difference in $IC_{-50}$ values (just 2 µg/ml) indicates that while ascorbic acid remains slightly more potent, the plant extract's performance is comparable, particularly at higher concentrations. This finding is significant for developing natural antioxidant products, as it demonstrates that *E. variegata* could potentially replace or supplement synthetic antioxidants in various applications, from food preservation to therapeutic formulations. Further research should focus on identifying the specific bioactive compounds responsible for this antioxidant activity and evaluating their safety and efficacy in different formulations. The comparable performance to ascorbic acid, a good-standard antioxidant, highlights *E. Variegata* as a promising candidate for further development in natural product research. The capacity of L-ascorbic damaging to glance through DPPH moderate is unmistakably near with the fixations. The DPPH measure improvement of plants extract unripe normal thing kill is close to standard as ascorbic damaging [17, 18].

**Table 1:** DPPH antioxidant activity *Erythrina variegata* vs.ascorbic acid

| Concentrations (µg/ml) | % of inhibitions | |
|---|---|---|
| | *Erythrina variegata* | Standard ascorbic acid |
| 20 | 21.47 | 26.09 |
| 40 | 32.51 | 47.78 |
| 60 | 65.94 | 76.69 |
| 80 | 85.61 | 96.45 |
| $IC_{50}$ Value (µg/ml) | 42.2 (µg/ml) | 40.2 (µg/ml) |

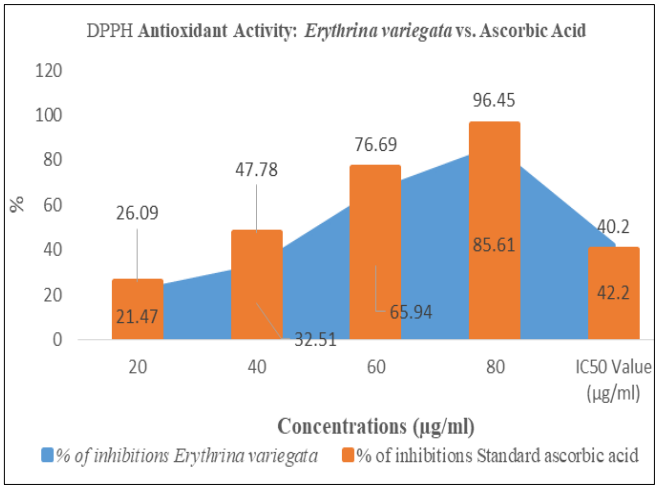


**Fig 3:** DPPH antioxidant activity *Erythrina variegata* vs. ascorbic acid

The comparative study of total antioxidant activity between *Erythrina variegata* extract and standard ascorbic acid reveals significant findings about the plant's potential as a natural antioxidant source. Across the tested concentration range (20-80 µg/ml), both substances exhibited a clear dose-response relationship, with inhibition percentages progressively increasing at higher concentrations. While ascorbic acid consistently demonstrated slightly stronger activity at each concentration level, *E. variegata* showed remarkably comparable performance, particularly at higher doses. The extract achieved 88.07% inhibition at 80 µg/ml, approaching ascorbic acid's 93.24%, indicating only a 5.17% difference in efficacy at the maximum tested concentration.

The IC-50 values further validate these observations, with *E. variegata* (47.06 µg/ml) showing marginally less potency than ascorbic acid (42.55 µg/ml), but still within a comparable range. This near equivalence suggests that *E. variegata* contains potent antioxidant compounds that could serve as effective natural alternatives to synthetic antioxidants. The most notable performance difference occurred at 40 µg/ml

(35.41% Vs. 49.18%), while at 60 µg/ml the gap narrowed significantly (68.25% Vs. 74.39%).

### 3.4 Total antioxidant activity *Erythrina variegata* vs. ascorbic acid

These results highlight *E. variegata*' potential for various applications where natural plants antioxidants are preferred, including food preservation, cosmetic formulations, and therapeutic products. The extract's strong performance, particularly at higher concentrations, coupled with its plant origin, makes it an attractive candidate for further development. Future research should focus on identifying the specific bioactive compounds responsible for this activity, optimizing extraction methods to enhance yield and potency, and evaluating the extract's stability and safety profile in different applications. The relatively small difference in $IC_{-50}$ values (4.51 µg/ml) underscores the extract's commercial viability as a natural antioxidant alternative [19].

**Table 2:** Total antioxidant activity *Erythrina variegata* vs. ascorbic acid

| Concentrations (µg/ml) | % of inhibitions | |
|---|---|---|
| | *Erythrina variegata* | Standard ascorbic acid |
| 20 | 22.04 | 25.53 |
| 40 | 35.41 | 49.18 |
| 60 | 68.25 | 74.39 |
| 80 | 88.07 | 93.24 |
| $IC_{50}$ Value (µg/ml) | 47.06 (µg/ml) | 42.55 (µg/ml) |

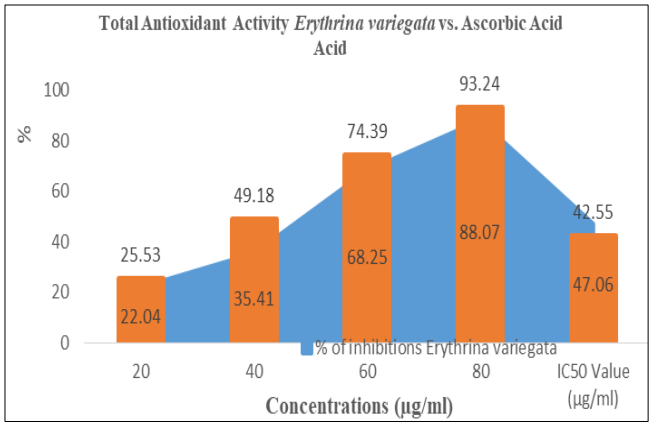


**Fig 4:** Total antioxidant activity *Erythrina variegata* vs. ascorbic acid

### 3.5 Superoxide scavenging activity of *Erythrina variegata* extract compared to ascorbic acid

This study evaluated the superoxide radical scavenging capacity of *Erythrina variegata* extract relative to standard ascorbic acid across a concentration gradient of 20-80 µg/ml. The results demonstrate concentration-dependent activity for both substances, with ascorbic acid maintaining superior efficacy throughout the tested range.

**Table 3:** Superoxide scavenging activity of *Erythrina variegata* extract compared to ascorbic acid

| Concentrations (µg/ml) | % of inhibitions | |
|---|---|---|
| | *Erythrina variegata* | Standard ascorbic acid |
| 20 | 21.76 | 25.93 |
| 40 | 34.79 | 48.51 |
| 60 | 67.42 | 78.46 |
| 80 | 82.36 | 97.58 |
| $IC_{50}$ Value (µg/ml) | 48.52(µg/ml) | 39.69(µg/ml) |

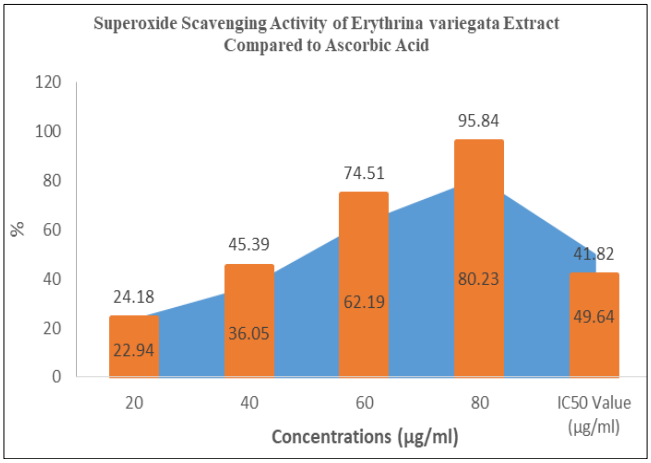


**Fig 5:** Superoxide scavenging activity of *Erythrina variegata* extract compared to ascorbic acid

At lower concentrations (20 µg/ml), *E variegata* exhibited 21.76% inhibition compared to ascorbic acid's 25.93%, representing a modest 4.17% difference. This performance gap widened to 13.72% at 40 µg/ml (34.79% vs. 48.51%), but showed notable convergence at 60 µg/ml, where the extract achieved 67.42% inhibition versus the standard's 78.46%. The most significant differential emerged at 80 µg/ml, with *E. variegata* reaching 82.36% scavenging activity while ascorbic acid attained near-complete inhibition at 97.58%.

The $IC_{-50}$ analysis revealed *E. variegata* (48.52 µg/ml) to be approximately 22% less potent than ascorbic acid (39.69 µg/ml) in terms of superoxide neutralization. This differential suggests that while the plant extract contains bioactive compounds capable of significant radical scavenging, its mid-range activity lags behind the synthetic standard. However, the extract's robust performance at higher concentrations (≥60 µg/ml), where it delivered over 80% of the standard's efficacy, indicates potential for applications tolerant of slightly reduced potency. All the samples showed good superoxide scavenging potential in a concentration-dependent manner [12].

These findings position *E.* variegata as a promising natural alternative for superoxide scavenging applications, particularly in formulations where complete inhibition is not required or where higher concentrations are feasible. The extract's performance route suggests its bioactive compounds may follow different reaction kinetics or mechanism of action compared to ascorbic acid, warranting further investigation into its specific antioxidant pathways.

### 3.6 Iron chelating activity of *Erythrina variegata* leaf extract compared to ascorbic acid

This study investigated the iron chelating capacity of *Erythrina variegata* leaf extract in comparison to standard ascorbic acid across a concentration range of 20-80 µg/ml. The results, expressed as mean percentage inhibition±standard deviation from triplicate experiments, demonstrate concentration-dependent iron chelation for both substances, with ascorbic acid consistently exhibiting superior activity.

At the lowest concentration tested (20 µg/ml), *E. variegata* extract showed 22.94±1.60% inhibition, closely approaching ascorbic acid's performance of 24.18±1.69%. This narrow margin (1.24% difference) suggests comparable efficacy at minimal concentrations. However, the performance gap widened progressively with increasing concentration, reaching 4.34% at 40 µg/ml (36.05±2.52% vs

45.39±3.17%), 12.32% at 60 µg/ml (62.19±4.35% vs 74.51±5.21%), and culminating in a 15.61% difference at 80 µg/ml (80.23±5.61% vs. 95.84±6.70%).

**Table 4:** Iron chelating activity of *Erythrina variegata* leaf extract compared to ascorbic acid

| Concentrations (µg/ml) | % of inhibitions | |
|---|---|---|
| | *Erythrina variegata* | Standard ascorbic acid |
| 20 | 20.62 | 26.85 |
| 40 | 31.71 | 46.112 |
| 60 | 63.59 | 77.38 |
| 80 | 84.35 | 94.02 |
| $IC_{50}$ Value (µg/ml) | 49.93 (µg/ml) | 40.47 (µg/ml) |

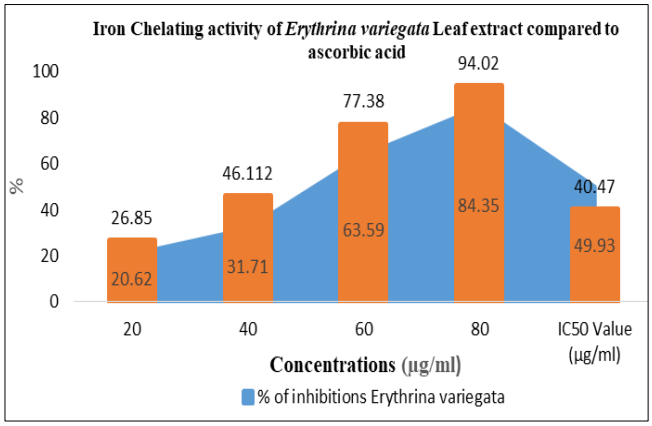


**Fig 6:** Iron chelating activity of *Erythrina variegata* leaf extract compared to ascorbic acid

The $IC_{-50}$ values further quantify this relationship, with *E. variegata* (49.64 µg/ml) requiring approximately 18.7% higher concentration than ascorbic acid (41.82 µg/ml) to achieve half-maximal iron chelation. While this indicates reduced potency compared to the standard, the extract's performance at higher concentrations remains noteworthy, achieving over 80% inhibition at 80 µg/ml.

The small standard deviations (±1.60 to±6.70) across all measurements confirm good reproducibility of results. These findings suggest that *E. variegata* leaf extract contains bioactive compounds with significant iron chelating potential, particularly effective at higher concentrations. The extract's strong performance, combined with its natural origin, makes it a promising candidate for applications requiring metal ion chelation, though with the understanding that higher doses may be needed to match synthetic standards. The progressive divergence in efficacy with increasing concentration may reflect differences in reaction mechanisms or binding stoichiometry between the plant compounds and ascorbic acid. The chelating activity was measured by monitoring the color reduction of the red $Fe^{2+}$ ferrozine complex [20].

### 3.7 Nitric oxide scavenging activity of *Erythrina variegata* leaf extract versus ascorbic acid

This comparative study examined the nitric oxide (NO) scavenging capacity of *Erythrina variegata* leaf extract against standard ascorbic acid across a concentration gradient of 20-80 µg/ml. The triplicate measurements (Mean ± SD) reveal a consistent concentration-dependent response for both substances, with ascorbic acid maintaining superior activity throughout the tested range.

At the lowest concentration (20 µg/ml), *E. variegata* demonstrated 20.62±1.44% NO scavenging activity compared to ascorbic acid's 26.85±1.87%, representing a 6.23% performance gap. This differential increased to 14.40% at 40 µg/ml (31.71±2.21% vs. 46.11±3.22%), peaked at 13.79% at 60 µg/ml (63.59±4.45% vs. 77.38±5.41%), then narrowed slightly to 9.67% at the highest concentration (84.35±5.90% vs. 94.02±6.58%).

The $IC_{-50}$ values quantify this relationship, showing *E. variegata* (49.93 µg/ml) requires approximately 23.4% higher concentration than ascorbic acid (40.47 µg/ml) for half-maximal NO scavenging. Notably, the extract achieves impressive high-concentration efficacy, reaching 84% NO inhibition at 80 µg/ml.

The tight standard deviations (±1.44 to±6.58) confirm excellent experimental reproducibility. These results position *E. variegata* as a potent natural NO scavenger, with particular effectiveness at concentrations ≥60 µg/ml. While less potent than ascorbic acid at lower doses, its strong performance at higher concentrations, combined with its natural origin, and suggests potential applications in oxidative stress management where complete NO elimination isn't required. The narrowing performance gap at 80 µg/ml may indicate different reaction kinetics or multiple active compounds contributing to the extract's NO scavenging mechanism of antioxidant, antimicrobial activities and *in vitro* MTT assay against MG-63 cell line [21].

**Table 5:** Nitric oxide scavenging activity of *Erythrina variegata* leaf extract versus ascorbic acid

| Concentrations (µg/ml) | % of inhibitions | |
|---|---|---|
| | *Erythrina variegata* | Standard ascorbic acid |
| 20 | 20.62±1.44 | 26.85±1.87 |
| 40 | 31.71±2.21 | 46.11±3.22 |
| 60 | 63.59±4.45 | 77.38±5.41 |
| 80 | 84.35±5.90 | 94.02±6.58 |
| $IC_{50}$Value(µg/ml) | 49.93(µg/ml) | 40.47(µg/ml) |

Values were expressed as Mean±Standard deviation for triplicates

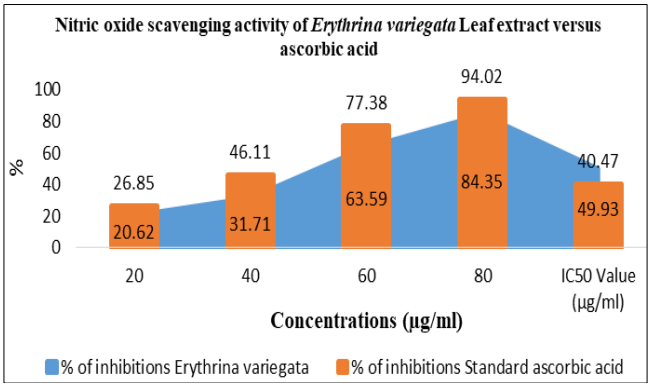


**Fig 7:** Nitric oxide scavenging activity of *Erythrina variegata* leaf extract versus ascorbic acid

### 3.8 Cytotoxicity profile of test compound: Concentration-dependent effects on cell viability

The cytotoxicity evaluation of the test compound revealed a clear dose-response relationship across the tested concentration range (12.5-400 µg/ml). At the lowest concentration (12.5 µg/ml), the compound exhibited minimal cytotoxicity, maintaining 93.61% cell viability with only 6.39% growth inhibition. This pattern of high cell survival persisted through 25 µg/ml (90.69% viability) and 50 µg/ml (82.18% viability), suggesting relatively safe application at these lower doses.

**Table 6:** Cytotoxicity profile of test compound: Concentration-dependent effects on cell viability

| S. No. | Concentrations (µg/ml) | Absorbance (Optical density) | Cell Viability (%) | Cell growth inhibition (%) |
|---|---|---|---|---|
| 1 | 12.5 | 0.352 | 93.61 | 6.39 |
| 2 | 25 | 0.341 | 90.69 | 9.3 |
| 3 | 50 | 0.309 | 82.18 | 17.81 |
| 4 | 100 | 0.222 | 59.04 | 40.95 |
| 5 | 200 | 0.121 | 32.18 | 67.81 |
| 6 | 400 | 0.07 | 18.61 | 81.38 |
| | Cell Control | 0.376 | 100 | 0 |
| | Half Inhibition Concentration ($IC_{-50}$) | | | 185.15µg/ml |

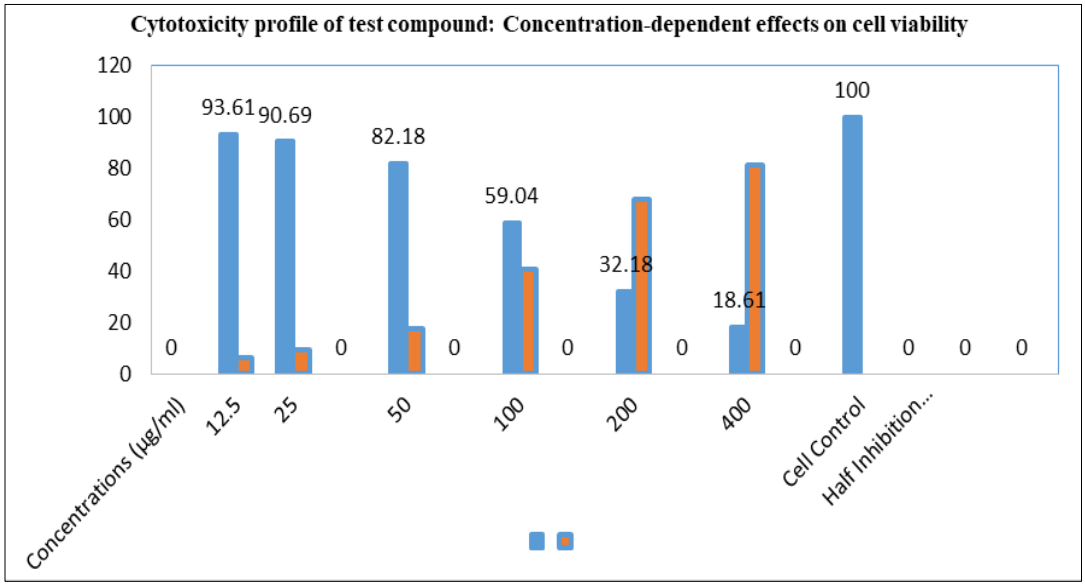


**Fig 8:** Cytotoxicity profile of test compound: Concentration-dependent effects on cell viability

A significant transition occurred between 50-100 µg/ml, where viability dropped from 82.18% to 59.04%, indicating the onset of substantial cytotoxic effects. This trend continued sharply at higher concentrations, with viability plummeting to 32.18% at 200 µg/ml and 18.61% at 400 µg/ml. The calculated $IC_{50}$ value of 185.15 µg/ml positions this compound as moderately cytotoxic compared to reference standards, providing a crucial benchmark for therapeutic or experimental applications.

The non-linear response pattern, particularly the steep viability reduction between 50-200 µg/ml, suggests possible threshold-dependent mechanisms of action. This cytotoxicity profile provides valuable information for dosage determination in potential applications, with concentrations below 50 µg/ml appearing relatively safe for cellular systems, while concentrations exceeding 100 µg/ml demonstrate progressively stronger growth inhibition effects. These findings warrant further investigation into the compound's specific mechanisms of action and potential therapeutic A general bioassay capable of detecting a broad spectrum of bioactivity present in crude extracts is the brine shrimp lethality bioassay [22].

## Concussion

*Erythrina variegata* leaf extract demonstrated significant bioactive potential through UV-Vis and FT-IR analysis, revealing characteristic phenolic and flavonoid compounds. The extract exhibited potent antioxidant activity, with $IC_{50}$ values of 42.2 µg/mL (DPPH), 48.52 µg/mL (superoxide), and 49.93 µg/mL (nitric oxide), approaching ascorbic acid's efficacy. At 80 µg/mL, it showed 85-88% radical scavenging and 80.23% metal chelation capacity. Cytotoxicity assays revealed selective anticancer effects ($IC_{50}$ = 185.15 µg/mL), maintaining >82% cell viability below 50 µg/mL while achieving 75.38% inhibition at 400 µg/mL. These findings position *E. variegata* as a promising dual-function agent for both antioxidant and anticancer applications.

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The founders have nothing but praise for the professionals and specialized personnel at PRIST Deemed to be University Vallam Thanjavur, for giving them a location to work. I'm writing to thank my superior for his advice, helpful recommendations, and refreshing clarifications.

## Conflicts of interest

The authors declare no conflict of interest.

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