

Pharmacognostic, Phytochemical Investigation and Antioxidant Potential of *Embelia ribes*

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ABSTRACT

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The recent global resurgence of interest in herbal medicines has led to an increase in the demand for them. In Indian system of medicine 'Ayurveda' *Embelia ribes* is popularly known as Vidanga. The present study was undertaken to investigate the pharmacognostical and phytochemical parameters of *Embelia ribes*. Chronic diseases such as cancer, diabetes, neurodegenerative and cardiovascular diseases are characterized by an enhanced state of oxidative stress, which may result from the overproduction of reactive species and/or a decrease in antioxidant defenses. The search for new chemical entities with antioxidant profile is still thus an emerging field on ongoing interest. *Embelia ribes* have traditionally been used to manage several diseases such as rheumatism, diarrhea, diabetes mellitus, and cough. The results of the free radical scavenging activity of the DPPH radical assay method for antioxidant activity have shown that the *Embelia ribes* extract exhibits significant scavenging activity.

Keywords: *Embelia ribes*, Pharmacognostic, Phytochemical, DPPH radical assay method, scavenging activity, Antioxidant activity.

I. INTRODUCTION

Vidang (*Embelia ribes* Burm. f.) possess some important Ayurvedic properties i.e. Rasa- Tikta; Guna- Tikshna; Virya- Ushna; Vipaka -Katu; Karma - Anulomana, Dipana, Kriminisana, Vitakaphipaha. Vidanga (*Embelia ribes* Burm. f.) is used as main ingredient in important ayurvedic formulations like Vidangirishta, Vidanga lauha, and Vidangidi lauha etc¹. It is used in treatment either alone or with the combination of other plants. It is traditionally used to

treat ulcers, gastrointestinal disorders, acne vulgaris and possess strong adaptogenic action and cumulative adaptogenic property². The plant parts like fruits, seeds, roots are widely used in ayurvedic preparations. Seeds form an ingredient in herbal preparations for treatment of liver ailments, leprosy, ringworm infections and other skin eruptions, gastrointestinal disorder³⁻⁴. Root extract is prescribed as contraceptive⁵⁻⁷. The liquid of boiled roots is taken by mothers to rectify the lactation problems and whole plant is prescribed in anorexia, oedema, hepatitis,

piles, and diabetes. The plant is not only traditionally believed to possess medical values but has already been reported scientifically for several activities like Hepatoprotective, Neuroprotective, Antibacterial, Antifungal, Analgesic, Hypoglycemic, Antioxidant, Anticancer, Anthelmintic, Anticonvulsant, Wound healing, Antifertility, Adaptogenic, Cardioprotective etc⁸. Growth of green chemistry holds necessary potential for the reduction of by product, a reduction in the waste production and a lowering of energy cost¹⁰⁻¹³. Due to its ability to couple directly with reaction molecule and passing thermal conductivity leading to fast rise in the temperature microwave irradiation had used to improve many organic synthesis¹⁴. Experiments have proved that microwave, in comparison with the Soxhlet extraction, use a lesser volume of solvent and sample and perform extraction at a much faster rate were previously reported for various plant extraction¹⁵⁻²⁷. Computational studies are the crucial steps in the drug designing. Docking study is the computational routine to determine probable binding manners of a ligand to the dynamic site of a receptor. It makes an image of the dynamic site with interaction points known as grid. Then it fits the ligand in the binding site either by grid search or energy search. Due to failure of ADME so it necessary to perform docking studies before pharmacological activity. An outbreak of coronavirus disease (COVID-19) caused by the novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) raises an unparalleled challenge in the discovery of appropriate drugs for prevention and treatment. Given the rapid pace of scientific research and clinical data produced by the large number of people quickly infected with SARS-CoV-2, clinicians need reliable proof of successful medical care for this infection as in intial stage with help of molecular docking software it is easy to do research with help of docking software²⁸⁻³⁵. The chemical modification of drug delivery system for protein and peptide drugs is important in improving both enzymatic stability and membrane permeations can help to have good

biological activity from any heterocyclic compound modification³⁶⁻⁴⁰. Someday soon, you might be making your own medicines at home. That's because researchers have tailored a 3D printer to synthesize pharmaceuticals and other chemicals from simple, widely available starting compounds fed into a series⁴¹⁻⁶⁷. The free radicals may be either Oxygen derived (ROS) or Nitrogen derived (RNS). The most common reactive oxygen species include superoxide anion (O_2^-), hydrogen peroxide (H_2O_2), peroxy radicals (ROO) and reactive hydroxyl radicals (OH)⁶⁷. The nitrogen derived free radicals are nitric oxide (NO), peroxy nitrite anion (ONOO), Nitrogen dioxide (NO_2) and Dinitrogen trioxide (N_2O_3)⁶⁸⁻⁶⁹. The exogenous sources of ROS include electromagnetic radiation, cosmic radiation, UV-light, ozone, cigarette smoke and low wavelength electromagnetic radiations and endogenous sources are mitochondrial electron transport chain, β -oxidation of fat. Chemical compounds and reaction capable of generating potential toxic oxygen species/free radicals are referred to as 'pro-oxidants' In this present investigation we tried to find out the antioxidant the probable cause behind it⁷⁰⁻⁷¹.

II. METHODS AND MATERIAL

Collection of Plant Material

Embelia ribes were collected from the residential areas of Vita, Sangli, Maharashtra, India and authenticated from the Department of Botany, Y.C. College of Science, Karad.

Preparation of Plant Extract

Shade drying was done for almost a month as to avoid chemical degradation due to sunlight. Grinding of the dried material was done, with the aid of a grinder and converted into coarse powder. Extraction of *Embelia ribes* was done by microwave extraction further filtered and excess solvent present was evaporated and dried extract were collected and subjected for further studies.

Macroscopy and Phytochemical Evaluation

Different physicochemical parameters like Total ash, acid insoluble ash, water soluble ash, ethanol soluble extractive value, water soluble extractive value, loss on drying were carried out on collected sample.

In-vitro Antioxidant activity

The antioxidant activity was performed with appropriate modification using DPPH radical scavenging assay process. In short, the assay was performed at 517 nm using UV spectrophotometer. In the test tube was applied 1 mL of DPPH solution (25 μ M) to the 1 mL extract solution (10^{-4} M). The solution was incubated at 37°C for 30 min, and the absorbance of each solution was calculated against the blank solution of the reagent at 517 nm. The reference antioxidant was ascorbic acid (25 μ M). Experimental values summarized for radical scavenging assays with DPPH are expressed as mean \pm standard mean error (SEM). The percent free radical scavenging activity was calculated by the formula given below⁷²⁻⁷³.

$$\% \text{ Scavenging} = \frac{\text{Control absorbance} - \text{Test absorbance}}{\text{Control absorbance}} \times 100$$

III. RESULTS AND DISCUSSION**Macroscopy**

A large scandant Straggling shrub with a long slender brittle stem, It is a Climbing-111 creeper shurb, flxible, and terete branches; bark studded with lenticels Leaves simple, coriaceous, alternate, elliptic - ovate - lanceolate, smooth leaves gland dotted, short and obtusely acuminate, broad, entire perfectly glabrous,, . It is about 3 inch long and 1 ½ inches broad, shiny above. And nodulated. PETIOLE; 1.0 cm to 0.8cm margined, MIDRIB; prominent.

Physico-chemical analysis of *Embelia ribes*:

Embelia ribes. was collected for the analysis of various Physico-chemical parameters is tabulated in Table 1. Deterioration time of the plant material depends upon the amount of water present in plant material. If the

water content is high, the plant can be easily deteriorated due to fungus. The loss on drying at 105°C in root was found to be 7.58 %. Total ash value of plant material indicated the amount of minerals and earthy materials attached to the plant material. Analytical results showed total ash value content was 6.31 %. The negligible amount of acid-insoluble siliceous matter present in the plant was 0.44%. The water-soluble extractive value was indicating the presence of sugar, acids and inorganic compounds. The alcohol soluble extractive values indicated the presence of polar constituents like phenols, alkaloids, steroids, glycosides, flavonoids the results given in Table 1.

Table 1. Physicochemical parameters of *Embelia ribes*

Sr. No.	Name of Parameters	Results
1	Loss on drying at 105°C (% w/w)	7.58
2	Total Ash (% w/w)	6.31
3	Acid-insoluble ash (% w/w)	0.44
4	Water-soluble extractive (% w/w)	12.8
5	Alcohol-soluble extractive (% w/w)	11.4

Antioxidant activity

The extract was tested with 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical assay method using ascorbic acid as normal for their free radical scavenging activity. Extract shows significant scavenging activity ranging from 78 to 88% and the data is expressed in Mean \pm SEM. in Table 2.

Table 2. In-vitro antioxidant activity of the *Embelia ribes* extract:

Sr. no	Test Subs.	Percentage free radical scavenging Activity
1	Methanolic Extract	81.94 ± 3.11
2	Ethanollic Extract	78.10 ± 2.42
3	Ethyl Acetate Extract	85.12 ± 7.82
4	Chloroform Extract	88.32 ± 1.26
5	Ascorbic acid (std)	91.49 ± 2.64

*Results are expressed as the mean values from three independent experiments ± SEM.

IV. CONCLUSION

Morphology as well as various pharmacognostic aspects of the *Embelia ribes* Burm. f. sample was studied and described along with physico-chemical parameters. These parameters will be useful in authentication and identifying the adulterants and quality control of raw drugs. *Embelia ribes* exhibited a set of diagnostic characters which will help to identify the drug in dried condition. The periodic assessment is essential for quality control and assurance for safer use of herbal drugs. Antioxidants are tremendously important substances which possess the ability to protect the body from damage caused by free radical induced oxidative stress. The antioxidant potential of *Embelia ribes* leaf extracts was investigated in the search for new bioactive compounds from natural resources. Tests of 2,2-diphenyl-1-picryl hydrazyl (DPPH) radical assay demonstrated significant scavenging activity of *Embelia ribes* extracts. The results obtained showed that this plant is very important from medicinal point

of view, and it needs further phytochemical exploitation to isolate phytochemical constituents showing antioxidant activity. The present study will help the researchers as basic data for future research in exploiting the hidden potential of this important plant which has not been explored so far.

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