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Evaluation of Antioxidant and Antimicrobial Properties of *Ixora brachiata* Roxb.

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Abstract: A study was conducted on antioxidant and antimicrobial properties of *Ixora brachiata* Roxb. The methanol extract showed very high concentration of phenolics (615 mg/100 g). The extract showed reducing property. The *Ixora brachiata* Roxb. bark powder found to contain 71.15 mg/100 g of protein. The water extract inhibited the growth of *Staphylococcus*.

Keywords: Antioxidant, *Ixora brachiata* Roxb., Antimicrobial.

Introduction

Antioxidants are micronutrients that have gained interest in recent years due to their ability to neutralize the actions of free radicals¹. Free radicals are potentially harmful products generated during a number of natural processes in the body and associated with ageing of cells and tissues. Failure to remove active oxygen compounds, over a long term, can lead to cardiovascular disease, cancer, diabetes, arthritis and various neurodegenerative disorders². Hence the recent research on development of healthy foods focuses on antioxidant properties. Consumers demand food products with fewer synthetic additives but expect increased safety, quality and shelf- life. This demand has led to renewed interest in the use of natural antimicrobials to preserve foods. Though there is wide range of potential antimicrobials available, only few are suitable for use. In the literatures available, the compounds other than phenolics are suspected to be the antioxidant and antimicrobial principle. In the present study the antimicrobial and antioxidant properties of *Ixora brachiata* Roxb. was investigated. *Ixora* is a genus from the family Rubiaceae, consisting of tropical evergreens and shrubs. *Ixora brachiata* Roxb. is commonly known as Korajji in Tulu

in Dakshina Kannada District of Karnataka State, which is commonly used in skin diseases by folklore Vaidyas. It is a small evergreen tree, commonly grows about 6-10 feet in height. It has elliptic- oblong leaves which are about 20 cm long & 7.5 cm broad. Flowers are white (Figure 1) and sweet scented. According to Siddha literature, this plant has anti-inflammatory, aromatic and antipyretic properties. But the literature on antioxidant and antimicrobial properties are scanty. So this study was conducted.



Figure 1. Inflorescence of *Ixora brachiata* Roxb.

Experimental

Preparation of sample extract

50 g of *Ixora* bark was homogenized in 100 mL of methanol using a Waring blender at high speed for 1 min at 4 °C. The extract was stirred 10 min at 4 °C and filtered through four layer of cheesecloth and the residue was re-extracted under the same condition with 100 mL of methanol. The combined filtrate was concentrated under vacuum at 65 °C to dryness and the dry residue was dissolved in 10 mL of methanol. These methanolic extracts were used for the determination of total phenolics and reducing activity.

Determination of total phenolics

The total phenolics of extracts were quantified colorimetrically using Folin-Ciocalteu reagent and phenol (crystalline) as standard³. Five milliliters of Folin-Ciocalteu (diluted ten fold in distilled water), 2 mL of sodium bicarbonate (200 g.L⁻¹) and 2 mL of distilled water were added to 1 mL of extract. After 15 min incubation at room temperature, the absorbance was read at 730 nm using a spectrophotometer. The results are expressed in phenol equivalents.

Reducing capacity assessment

The reducing capacity (RP) of the extracts was assessed as described by Oyaizu⁴. Two milliliters of extracts were added to potassium ferricyanide (2.5 mL, 10 g.L⁻¹) and the mixture incubated at 50 °C for 20 min. Trichloroacetic acid (2.5 mL 100 g.L⁻¹) was added to the mixture, which was then centrifuged at 650 × g for 10 min. The supernatant (2.5 mL) was mixed with distilled water (2.5 mL) and ferric chloride (0.5 mL, 1 g L⁻¹). The absorbance was read at 700 nm. Higher absorbance indicated greater reducing capacity.

Protein content

The protein content of the *Ixora brachiata* Roxb. Bark powder was determined as per Lowry's procedure⁵.

Antimicrobial activity

The Antimicrobial activity was studied by paper disc method. The paper discs were dipped in the water extracts of bark of *Ixora brachiata* Roxb. and placed over the nutrient agar medium

swabbed with *Staphylococcus* inoculum and incubated at 37 ± 1 °C. The zone of inhibition was measured after 16 hours. A treatment without bark extract was maintained as control.

Results and Discussion

The utility of antioxidant therapies in many diseases is well recognized. Cellular damage arising from an imbalance between free radical generating and scavenging systems has been implicated in the pathogenesis of a wide range of disorders, including cardiovascular disease, cancer and aging⁶. Wang *et al.*⁷ reported that phenolic compounds have capacity of reducing oxidative cellular damage caused by free radicals. In the present investigation the methanol extract of *Ixora brachiata* Roxb. Showed 615 mg/100 g of phenolics and the extract exhibited the reducing capacity of 2.2 percent Table 1. According to Davies⁸ the oxidative damage is very important effect of cellular free radicals which can leads to damage of cellular constituents. Their repair depends on presence of antioxidants. The antioxidant can donate either an electron or hydrogen to cellular molecules oxidized by free radicals. They can thus prevent damage of cellular constituents, including DNA, proteins and lipids membranes from free radicals. On the account of above observations, an important point can be noted that the increased amount of phenolics and reducing property exhibited by methanol extracts of *Ixora brachiata* Roxb. can help in decreasing the oxidative damage caused by free radicals. The protein content of *Ixora brachiata* Roxb. bark was determined. It was found to contain 71.15 mg/100 g dry weight Table 1. The water extract showed clear inhibition of *Staphylococcus* (Figure 2) which gives clear indication about it's antibacterial property.

Table 1. The medicinal and nutritional value of *Ixora brachiata* Roxb.

Particulars	Content/activity
Concentration of Phenolics, mg/100 g	615
Protein content, mg/100 g	71.15
Reducing property, %	2.2
Antimicrobial property. Inhibition zone diameter in mm.	14.75



Figure 2. Inhibition of staphylococcus by methanol extract of *Ixora brachiata* Roxb.

Conclusion

The result of this analysis clearly indicates that methanol extract of *Ixora brachiata* showed very high concentration of phenolics and also showed reducing property. The *Ixora brachiata* Roxb. Bark powder found to contain 71.15 mg protein /100 g. The water extract inhibited the growth of *Staphylococcus*.

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