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Original Research Article

EVALUATION OF THE ANTIOXIDANT ACTIVITY OF AQUEOUS EXTRACT FROM *SARACA ASOCA* FLOWER

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ABSTRACT

The antioxidant activity of the aqueous extract from *Saraca asoca* flowers was evaluated using in vitro methods to assess its potential as a natural antioxidant. The extract was obtained with a yield of 8.6%, and preliminary phytochemical screening revealed the presence of bioactive compounds including flavonoids, phenols, saponins, proteins, and diterpenes. The antioxidant activity was assessed using the DPPH (2, 2-diphenyl-1-picrylhydrazyl) method, where the aqueous extract exhibited dose-dependent free radical scavenging activity. The IC_{50} value of the aqueous extract was found to be 98.94 µg/ml, which was higher than that of ascorbic acid (21.30 µg/ml), indicating that the extract has moderate antioxidant potential. These findings suggest that *Saraca asoca* flowers could serve as a valuable natural source of antioxidants, which may be useful in the prevention of oxidative stress-related diseases.

Keywords: *Saraca asoca*, antioxidant activity, aqueous extract, DPPH assay, flavonoids, phenols, IC_{50}, free radical scavenging, phytochemical screening, natural antioxidants.

INTRODUCTION

Saraca asoca, commonly known as Ashoka, is a well-known medicinal plant in traditional Ayurvedic medicine. It is primarily found in India, Sri Lanka, and Southeast Asia, and has a long history of use in the treatment of various ailments, particularly in the management of gynecological disorders, such as menstrual irregularities and uterine problems. The plant is also noted for its anti-inflammatory, analgesic, and antimicrobial properties. However, the antioxidant activity of *Saraca asoca* flowers, specifically the aqueous extract, has garnered increasing interest in recent years due to the growing recognition of oxidative stress as a major contributor to several chronic diseases, including cancer, cardiovascular disease, and neurodegenerative disorders.

Antioxidants are molecules that can neutralize free radicals, thereby preventing oxidative damage to cells and tissues. The flower of *Saraca asoca* is known to contain a variety of bioactive compounds such as flavonoids, tannins, alkaloids, and phenolic acids, which are believed to contribute to its pharmacological activities, including antioxidant properties. Recent studies have demonstrated that these compounds may play a crucial role in scavenging free radicals, reducing oxidative stress, and protecting against cellular damage, which is fundamental for maintaining overall health and preventing the development of diseases associated with aging and environmental stress.

The use of aqueous extracts in medicinal plants is of particular interest because water, as a solvent, is generally considered safer, less

toxic, and more cost-effective compared to organic solvents. The aqueous extract of *Saraca asoca* flowers may provide a natural and efficient means of harnessing the plant's antioxidant potential, which could be used in therapeutic applications for preventing or managing oxidative stress-related conditions.

This study aims to evaluate the antioxidant activity of aqueous extracts from *Saraca asoca* flowers using in vitro assays, including DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical scavenging activity, FRAP (Ferric Reducing Antioxidant Power), and total phenolic content, to better understand its potential as an effective natural antioxidant source. By exploring its antioxidant properties, this study could provide valuable insights into the therapeutic potential of *Saraca asoca* flowers, especially in the context of preventing oxidative stress-related diseases.

MATERIALS AND METHODS

Extraction procedure

Following procedure was adopted for the preparation of extracts from the shade dried and powdered herbs:

Defatting of plant material

Flowers of *Saraca asoca* were shade dried at room temperature. The shade dried plant material (40 gram) was coarsely powdered and subjected to extraction with petroleum ether by maceration. The extraction was continued till the defatting of the material had taken place.

Extraction by maceration process

Defatted dried powdered of *Saraca asoca* has been extracted with aqueous using maceration process for 48 hrs, filtered and dried using vacuum evaporator at 40°C

Determination of percentage yield

The percentage yield of each extract was calculated by using following formula:

$$\text{Percentage yield} = \frac{\text{Weight of Extract}}{\text{Weight of powdered drug}} \times 100$$

Phytochemical Screening

Phytochemical examinations were carried out for all the extracts as per the standard methods (Harborne; 1998).

Antioxidant activity of aqueous extract of flowers of *Saraca asoca*

DPPH scavenging activity was measured by the spectrophotometer. Stock solution (6 mg in 100ml methanol) was prepared such that 1.5 ml of it in 1.5 ml of methanol gave an initial absorbance. Decrease in the absorbance in presence of sample extract at different concentration (10- 100 µg/ml) was noted after 15 minutes. 1.5 ml of DPPH solution was taken and volume made till 3 ml with methanol, absorbance was taken immediately at 517 nm for control reading. 1.5 ml of DPPH and 1.5 ml of the test sample of different concentration were put in a series of volumetric flasks and final volume was adjusted to 3 ml with methanol. Three test samples were taken and each processed similarly (Sridhar and Charles; 2019). Finally the mean was taken. Absorbance at zero time was taken for each concentration. Final decrease in absorbance was noted of DPPH with the sample at different concentration after 15 minutes at 517 nm.

$$Calculation\ of\ \%\ Reduction \frac{\text{Control Absorbance} - \text{Test absorbance}}{\text{Control Absorbance}} \text{X } 100$$

RESULTS AND DISCUSSION

The evaluation of the antioxidant activity of the aqueous extract of *Saraca asoca* flowers reveals interesting findings, providing valuable insights into its potential as a natural

antioxidant. The results from the extractive yield, phytochemical screening, and DPPH method suggest that *Saraca asoca* flowers contain bioactive compounds capable of scavenging free radicals and protecting against oxidative stress.

The aqueous extract of *Saraca asoca* flowers yielded 8.6%, as shown in Table 1. This moderate yield reflects the efficacy of water as a solvent in extracting bioactive compounds from the plant material. The aqueous extraction method is preferable for its non-toxic, cost-effective nature, and it demonstrates that the flowers of *Saraca asoca* contain a range of compounds that can be effectively extracted through water.

Table 2 presents the phytochemical screening of the aqueous extract of *Saraca asoca*. The presence of flavonoids, phenols, proteins, saponins, and diterpenes in the aqueous extract is noteworthy, as these compounds are known to exhibit antioxidant properties. Flavonoids and phenols, in particular, are widely recognized for their ability to neutralize free radicals, which helps in reducing oxidative damage. The presence of saponins further suggests potential anti-inflammatory and antimicrobial activities, while diterpenes have been shown to possess antioxidant and anticancer properties. However, the absence of alkaloids and carbohydrates in the aqueous extract suggests that the bioactive compounds contributing to the antioxidant activity are primarily phenolic and flavonoid compounds, which are known for their potent antioxidant effects.

The DPPH (2, 2-diphenyl-1-picrylhydrazyl) method was used to evaluate the antioxidant activity of both ascorbic acid (as a standard antioxidant) and the aqueous extract of *Saraca asoca* flowers. The percentage inhibition of DPPH by the aqueous extract increased with the concentration, indicating that the extract exhibits dose-dependent antioxidant activity. As shown in Table 3, at a concentration of 100 µg/ml, the aqueous extract of *Saraca asoca* demonstrated a 47.63% inhibition, while ascorbic acid, as a reference compound, exhibited a much higher inhibition of 87.96%.

The IC_{50} value is an important parameter that indicates the concentration required to inhibit 50% of DPPH radicals. The IC_{50} value for ascorbic acid was found to be 21.30 µg/ml, while for the aqueous extract of *Saraca asoca* it was 98.94 µg/ml. The higher IC_{50} value of the *Saraca asoca* aqueous extract suggests that, while the extract does have antioxidant activity, it is not as potent as ascorbic acid in scavenging free radicals. Nonetheless, the activity observed indicates that the extract has significant potential as an antioxidant, and further optimization could improve its efficacy.

The graphical representation of IC_{50} values (Figure 1) further highlights the comparison between ascorbic acid and the aqueous extract of *Saraca asoca*. The lower IC_{50} of ascorbic acid (21.30 µg/ml) reflects its superior antioxidant activity compared to the aqueous extract, which has an IC_{50} of 98.94 µg/ml. This comparison reinforces the fact that while *Saraca asoca* flowers demonstrate antioxidant potential, their activity is relatively less potent than that of a well-established antioxidant like ascorbic acid. The aqueous extract's performance suggests it could still offer benefits, particularly as part of a broader formulation of natural antioxidants.

Table 1: % Yield of *Saraca asoca*

S. No.	Extract	% Yield
1.	Aqueous	8.6%

Table 2: Phytochemical screening of extract *of Saraca asoca*

S. No.	Constituents	Aqueous extract
1.	**Alkaloids** Hager's test	 -ve
2.	**Flavonoids** Lead acetate Alkaline test	 +ve -ve
3.	**Phenol** Ferric chloride test	 +ve
4.	**Proteins** Xanthoproteic test	 +ve
5.	**Carbohydrates** Fehling's test	 -ve
6.	**Saponins** Foam test	 +ve
7.	**Diterpenes** Copper acetate test	 +ve

[+ve = Positive; -ve = Negative]

Table 3: % Inhibition of ascorbic acid, aqueous extract of *Saraca asoca* using DPPH method

S. No.	Concentration (µg/ml)	% Inhibition	
		Ascorbic acid	Aqueous extract
1	10	42.58	12.52
2	20	50.92	21.96
3	40	61.22	28.02
4	60	65.47	36.45
5	80	76.08	40.87
6	100	87.96	47.63
IC_{50} Value (µg/ml)		**21.30**	**98.94**

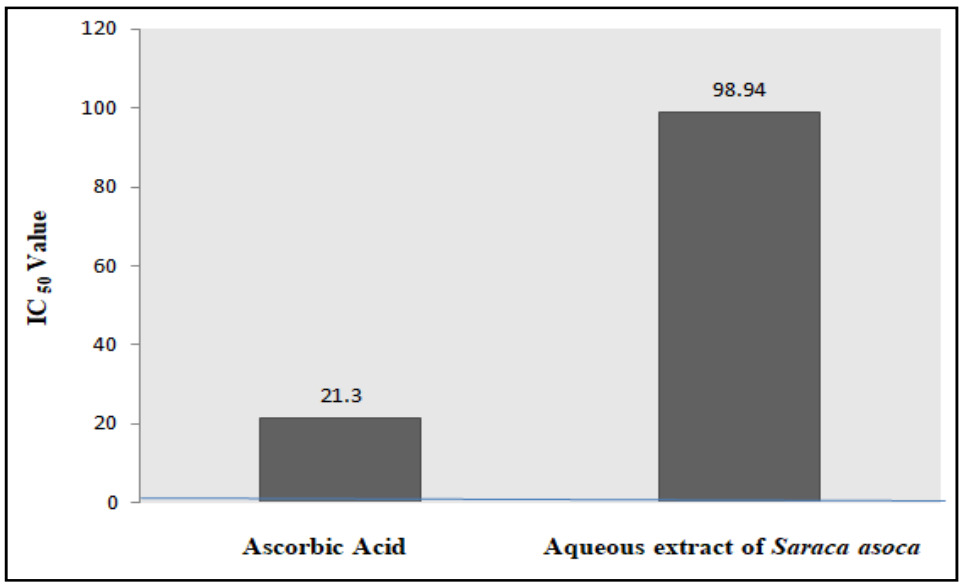

Figure 1: IC_{50} Value of ascorbic acid and aqueous extract of *Saraca asoca*

CONCLUSION

The aqueous extract of *Saraca asoca* flowers shows moderate antioxidant activity, with significant levels of flavonoids, phenols, and diterpenes contributing to its free radical-scavenging effects. Although the extract's antioxidant potential is less potent compared to ascorbic acid, its activity is still considerable, making it a promising natural antioxidant source. Further research could focus on enhancing the extract's potency through different extraction methods or by isolating and identifying the specific compounds responsible for its antioxidant effects. The findings from this study suggest that *Saraca asoca* flowers may offer potential health benefits, particularly in preventing oxidative stress-related diseases, and warrant further exploration for their therapeutic applications.

DECLARATION OF INTEREST

The authors declare no conflicts of interests. The authors alone are responsible for the content and writing of this article.

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