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Pharmacognostical and Antioxidant Properties of the Leaves of *Antiaris toxicaria* (Lesch)

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Abstract

Antiaris toxicaria Lesch commonly known as bark cloth tree belongs to the family Moraceae and their leaves were screened to in order to study the pharmacognostical and antioxidant properties. The physicochemical parameters such as Loss on drying, total ash, Acid insoluble ash, Water soluble ash and percentage of solubility were calculated. The leaves were also screened for the antioxidant property using standard ascorbic acid as a control and found that they possess good antioxidant property. Thus, the preliminary studies of the plant could help us to understand the medicinal properties of the plant and also help us to construct monograph of the plant.

Keywords

Antiaris toxicaria, Anti-oxidant, Moraceae, Pharmacological, Soxhlet.

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INTRODUCTION

In India, around 20,000 medicinal plant species have been recorded recently, while more than 500 traditional communities use about 800 plant species for curing different diseases [1]. Currently, 80% of the world population depends on plant-derived medicine for the first line of primary health care for human alleviation because it has negligible side effects [2]. Hence it is important to have knowledge about this method of holistic healing. Identification of natural products from plants that may serve as valuable sources of bioactive agents for medicinal and agricultural uses largely depends on bioactivity directed isolation. Among the important medicinal plants there was a fair number of documentation of *Antiaris* toxicaria that would confirm some of the traditional uses [3]. *Antiaris toxicaria* is a tree in the mulberry and fig family, Moraceae. It is the only species currently recognized in the genus *Antiaris*. *Antiaris toxicaria* Lesch is commonly called as "Bark cloth tree". Traditional healers reported that decoctions of leaves and stem bark were non-toxic when taken orally for treatment of malaria. Therefore, the present study was carried out to evaluate the physico-chemical and anti-oxidant properties of the leaves of *Antiaris toxicaria* in various solvents.

MATERIALS AND METHODS

The leaves of *A. toxicaria* were collected from Anaikatti, Coimbatore. The collected leaves were washed thoroughly, dried, powdered and stored in air tight container for further studies.

Physicochemical parameters [4, 5]

The plant powder was subjected to calculate total ash, acid insoluble ash and water-soluble ash, loss on drying, solubility percentage in alcohol and water and extractive values.

Loss on drying

Freshly collected and pre-weighed samples were dried in Hot air oven at 45°C until it reaches a constant weight.

Total ash

3gm of leaf powder was taken in silica crucible and ignited in an electric muffle furnace at 100°C until the sample free carbon. The percentage of total ash was calculated with reference to the air-dried sample.

$$\text{Percentage of ash value} = \frac{\text{Weight of fresh sample} - \text{Weight of dried sample}}{\text{Acid insoluble ash}} \times 100$$

Total ash obtained was heated with 25ml of diluted hydrochloric acid for 10 minutes, filtered in ash less filter paper (Whatman No.1) and the residue was incinerated in the furnace to get a constant weight. The weight of the insoluble matter was subtracted from the weight of total ash, represents the acid insoluble ash. The percentage of acid insoluble ash was calculated with reference to the air-dried drug.

Water soluble ash

The total ash obtained above was boiled with 25 ml of distilled water for 5 minutes. The insoluble matter was collected on an ash less filter paper, washed with hot water and dried to get constant weight at low temperature. The weight of the insoluble matter was subtracted from the weight of total ash, represents the water-soluble ash. The percentage of water-soluble ash was calculated with reference to the air-dried drug.

Solubility percentage

Alcohol

1gm of powdered material was mixed with 20ml ethyl alcohol and shaken frequently for 6 hours and kept undisturbed overnight. The extract was concentrated and the solubility percentage was calculated on dry weight basis.

Water

The procedure adopted for solubility percentage of alcohol, is used to calculate the solubility percentage of water.

Extractive values

The powdered materials were extracted with different solvents like petroleum ether, benzene, chloroform, acetone, methanol and water in a soxhlet apparatus. The extracts were concentrated and the extractive values were calculated on dry weight basis.

Antioxidant activity

Preparation of standard solution

The standard solution was prepared by dissolving 1mg of Ascorbic acid in 1ml of methanol to obtain various concentrations such as 20, 40, 60, 80 and 100 µg/ml.

Preparation of test sample

The methanol extract was dried and about 10mg of dried extract was dissolved in 10ml of methanol to give concentration of mg/ml.

DPPH Free Radical Scavenging Assay [6]

A solution of the radical is prepared by dissolving 2.4 mg DPPH in 100 ml methanol. A test solution of various concentrations such as 20, 40, 60, 80 and 100µl were added to 3.98, 3.96, 3.94, 3.92 and 3 ml of DPPH respectively. The mixture was shaken vigorously and kept at room temperature for 20 min in the dark. All the determinations were performed in triplicate. The DPPH reagent itself served as control. After 20 minutes the absorbance was measured at 515nm in spectrophotometer. The scavenging percentage of the extract was calculated using the following formula:

$$\% \text{ of scavenging} = \frac{\text{OD of control} - \text{OD of test}}{\text{OD of control}} \times 100$$

RESULTS

Physicochemical analysis

The leaf powder of *Antiaris toxicoria* was screened for analytical values like moisture content, total ash, acid insoluble ash, water soluble ash and solubility percentage of ash in alcohol and water. The results observed that moisture content was 7.7 %. The value of total ash, acid insoluble ash and water insoluble ash was 2.2%, 0.5% and 0.3% respectively. More acid insoluble ash value appears in *A. toxicaria* denotes that this plant powder ash was more soluble to acid than water. The solubility percentage of leaf powder was more in alcohol (19%) than water (17%) (Table 1).

Extractive Value

The leaf powder of the plant was subjected to successive solvent extraction using different solvents in soxhlet apparatus. The extractive values were observed to be better in polar solvents (water and methanol) than non-polar solvents (Table 2).

Antioxidant activity

Antioxidant studies were carried out to find out the antioxidant's properties of the selected plant material by DPPH method. Methanol extract was used for the study. The antioxidant activities of standard (ascorbic acid) and methanolic extract were increased with increasing concentration. The methanolic extract exhibited higher antioxidant activity than the standard (Table 3 & Figure 1).

DISCUSSION

The leaves of *A. toxicaria* were analysed to identify their physicochemical and antioxidant properties.

The physicochemical parameters help us to check the quality, standard and adulterants in the plant powder. Moisture is one of the major factors responsible for the deterioration of the drugs and affecting their shelf life [7]. In the present investigation, the moisture content of the leaves of the plant was found to be very low. Determination of ash value provides criteria for judging the purity of the drug [8]. A high ash value is an indicator of contamination, substitution, adulteration or carelessness in drug preparation or drug formulation for marketing. In the present investigation, ash value was found to be very low in the selected plant. The acid insoluble ash content was 0.5% which was found to be very low when comparing to the earlier report available in the leaves of *Ficus arnottiana*[9]. The remaining ash content showed the existence of inorganic components in the plant sample which shows the purity of the samples.

Extractive value plays an important role in evaluation of crude drugs. Less extractive value indicates addition of exhausted material, adulteration or incorrect processing during drying or storage or formulation [10]. In the present study, the extractive values were observed to be better in polar solvents than non polar solvents. The methanol and water extracts showed the highest percentage of extractive value indicated the quality of the drug.

Antioxidant protects the body against the damaging effects of free radicals produced naturally within the body. These free radicals' production could cause damage to proteins, DNA and the genetic material within the cells [11]. In the present study, methanol extract of the plant showed maximum antioxidant activity tested by DPPH method. This is due to the presence of flavonoids in plants and act as antioxidants. According to earlier report, the antioxidant activity of flavonoids has the ability to reduce free radical formation and scavenge the free radicals [12, 13]. In the present study, the plant extract showed the presence of flavonoids which are the reason behind the better antioxidant property. This finding resembles the earlier report available in *Morus alba* [14].

CONCLUSION

From the above findings, it is concluded that the methanolic extract of *A. toxicaria* exhibited better physico chemical and antioxidant properties than the other solvent extracts.

Table 1 - Physicochemical analysis of the leaves of *Antiaris toxicaria*

S. No	Parameter studied	Value expressed in % (W/W)
1	Loss on drying	7.7
2	Total ash	2.2
3	Acid insoluble ash	0.5
4	Water insoluble ash	0.3
5	Solubility % 1) Water	17
	2) Alcohol	19

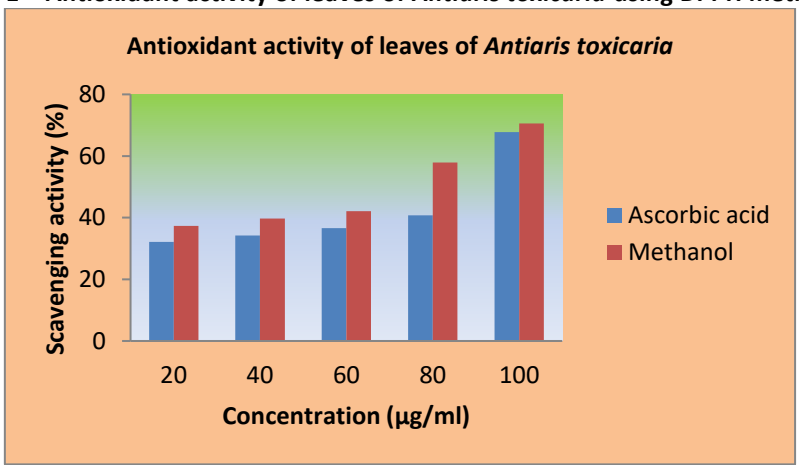
Table 2 - Extractive values of the leaves of *Antiaris toxicaria*

S.No.	Solvent	Yield (%)
1	Petroleum ether	0.89
2	Benzene	0.92
3	Chloroform	2.91
4	Acetone	2.34
5	Methanol	3.33
6	Water	3.11

Table 3 - Antioxidant activity of leaves of *Antiaris toxicaria*

S. No.	Concentration of plant extract (µg/ml)	DPPH scavenging activity (%)	
		Ascorbic acid (Standard)	Methanol extract
1	20	32.19	37.32
2	40	34.24	39.72
3	60	36.64	42.12
4	80	40.75	57.87
5	100	67.80	70.54

Fig. 1 – Antioxidant activity of leaves of *Antiaris toxicaria* using DPPH method



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