The antioxidant activity of ethanolic extract in *Vateria indica* Linn

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Abstract

Kahruba (*Vateria indica* Linn) is a resin used in Indian medicine as a tonic, carminative and expectorant. The resin exuded by the tree is known as Piney resin, White Dammar or Dhupa *Vateria indica* Linn is an Indigenous & Endemic plant species to the Western Ghats. The tree belonging to the family Dipterocarpaceae is distributed mainly in the southern Western Ghats in evergreen and semi-evergreen forests, along streams. The plant can be found described in almost all Unani literatures in the treatment of chronic bronchitis, anaemic disorder, ear disorder, skin disorder, gonorrhea, syphilis, urinary discharges, amenorrhoea, piles, and diabetes mellitus along with this it has various pharmacological activities such as antiinflammatory, anthelmintic, anti-ulcer, anti-tumor activity and anticancer. In the present study, antioxidant activity of *Vateria indica* resin was investigated. To assess the antioxidant activity, ethanol extract was used. Total antioxidant activity was estimated by phosphomolybdenum assay. *Vateria indica* (Linn.) is a critically endangered tree endemic to the South Western Ghats, India.

Keywords: Vateria indica, Antioxidant activity, Resin
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INTRODUCTION

Kahruba (*Vateria indica* Linn) is a large evergreen tree that belongs to the Dipterocarpaceae family. It is a multipurpose plant which has economic and medicinal importance. Resin from *Vateria indica* is known as white 'dammar'. Apart from medicinal uses, it has long been used as incense, and for making varnishes. It isobtained by cutting notches in the tree when it exudes and gradually hardens (Shrijani *et al*., 2018). The resin which is extensively used in Indian medicine is credited with tonic, carminative and expectorant properties. *Vateria indica* Linn, an endemic plant species to peninsular India, highly appreciated for its aromatic resin, Timber, Tallow etc., is at threat in its own land (William and David, 2005). Kahruba is the gum of the plant (Azam and Muheete Azam, 2012; Hakim,

2002; Kabeeruddin and Mufradat 2007). It is used for chronic bronchitis, piles, skin eruptions, ringworm, scrofula, tubercular glands, ulcers, wounds, boils; urinary discharges; amenorrhoea; gonorrhoea and syphilis (Khare, 2007). The resin is a complex mixture of several triterpene hydrocarbons, ketones, alcohols and acids, along with small amounts of sesquiterpenes (Alshabi *et al.*, 2022). Antioxidants are vital substances which possess the ability to protect the body from damage caused by free radical induced oxidative stress. Free radicals are highly reactive molecules containing one or more unpaired electron; they donate or take electron from other molecule in an attempt to pair their electron and generate a stable species (Aliyu *et al*., 2012). The free radicals and other reactive oxygen species can be scavenged by the protective role of antioxidants from the natural products of wild and medicinal plants (Pietta *et al*., 1998). The present study is aimed to analyze the antioxidant of the plant *Vateria indica.*

MATERIALS AND METHODS

SYSTEMATIC POSITION

Kingdom : Plantae
Phylum : Tracheophyta
Class : Magnoliopsida
Order : Malvales
Family : Dipterocarpaceae
Genus : *Vateria*
Species : *indica*

Collection of plant material

Resin of *Vateria indica* was collected from Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram, Kerala.

In vitro antioxidant activity

There are various in vitro and in vivo methods available for the evaluation of the antioxidant activity of natural products (Alam *et al*., 2013). The total antioxidant activity was determined using the standard method in order to evaluate the in vitro antioxidant activity.

Antioxidant activity is a system dependent and this is very characteristic could influence the outcome of any analysis. In this present study total antioxidant assay was employed which could provide a more consistent approach to assessing the antioxidant and radical scavenging potential of the *Vateria indica* resin extracts.

PHOSPHOMOLYBDENUM ASSAY (PM)

Total antioxidant activity was estimated by phosphomolybdenum assay sample preparation

One ml each of 0.6 M sulfuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate were added in 20 ml of distilled water and made up of volume to 50 ml by adding distilled water.

Procedure:

The phosphomolybdenum activity was performed by using standard protocols followed by Prieto *et al*.,(1999). 100 µl extracted of *Vateria indica* resin added to each test tube individually containing 3 ml of distilled water and 1 ml of Molybdate reagent solution. These tubes were kept

incubated at 95ºC for 90 min. After incubation, these tubes were at normalized to room temperature for 20-30 min and the absorbance of the reaction mixture was measured at 695 nm. Percentage of inhibition values from sample was calculated for each extract. Ascorbic acid was used as positive reference standard.

PM assay is based on the reduction of Phosphate-Mo (VI) to Phosphate Mo(V) by sample and subsequent formation of a bluish green colored phosphate/Mo (V) complex at acid pH. The phosphomolybdenum method is routinely applied in the laboratory to evaluate the total antioxidant capacity of plant extracts.

RESULTS AND DISCUSSION

Total Anti-oxidant Activity (PHOSPHOMOLYBDENUM ASSAY)

The result on total anti-oxidant activity of Ascorbic acid (standard) values were presented in Table 1 and Figure 1.

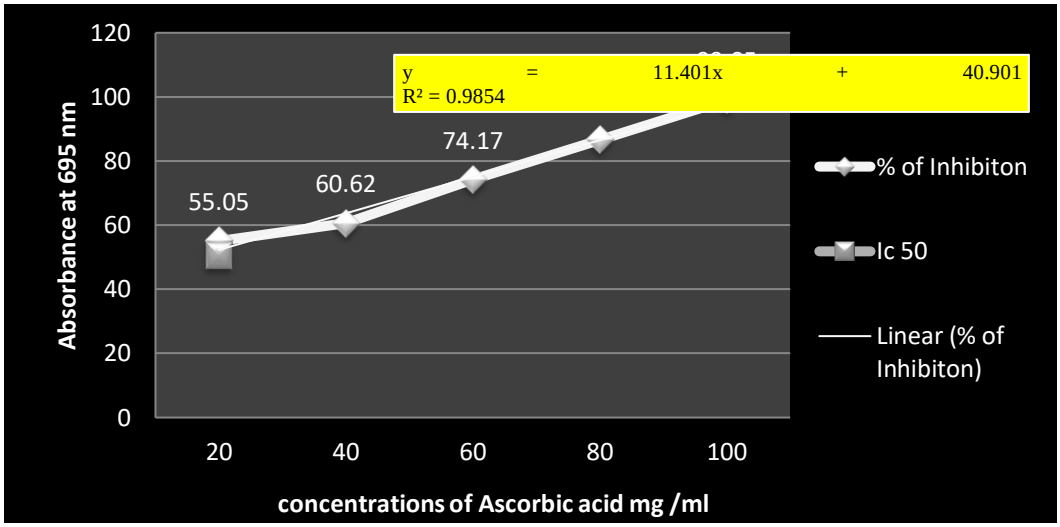
1. Total Anti-oxidant activity exhibited by different standard (Ascorbic acid) concentrations.

The standard ascorbic acid of 20, 40, 60, 80 and 100 µg /ml concentration showed the percentage values of 55.05, 60.62, 74.17, 86.63 and 99.05% respectively (Fig:1).

Table: 1. Total Anti-oxidant activity exhibited by different standard (Ascorbic acid) concentrations.

S. No	Concentration (µg/ml)		OD value at 520nm (in triplicates)			Mean OD	% of Inhibiton	Ic 50 Value (µg/ml)
			OD-I	OD-II	OD-III			
1	Control	Blank	0.96	0.95	0.97	0.96		
2	Ascorbic acid	20	0.99	1.01	0.99	1.002	55.05	50.38
		40	1.09	1.1	1.12	1.1	60.62	
		60	1.35	1.33	1.37	1.35	74.17	
		80	1.58	1.56	1.59	1.57	86.63	
		100	1.82	1.83	1.81	1.82	99.05	

Figure: 1. Total Anti-oxidant activity exhibited by different standard (Ascorbic acid) concentrations.



Total Anti-oxidant Activity (PHOSPHOMOLYBDENUM ASSAY)

The result on total anti-oxidant activity of *Vateria indica* resin was presented in Table 2 and Figure 2.

2. Total Anti-oxidant activity exhibited by *Vateria indica* resin using ethanol at different concentration.

The study extracts of *Vateria indica* resin was studied the potential of reducing the Phosphate-Mo (VI) into Phosphate Mo (V) through spectrophometric determination. The extracts were shown to possess the reducing activity against Phosphate-Mo (VI) with different concentration of 20 to 100 µg/mL compared with standard ascorbic acid at different concentration. The reducing capability was measured by reading the chromogenic reflection of the sample mixture at 695nm and the absorbance was recorded and calculated the percentage of sample's total anti-oxidant activity. The table showed the significant reduction of Phosphate-Mo (VI) by ethanol extract of *Vateria indica* resin was showed concentration dependant reduction property over Phosphate-Mo (VI). The percentage of reducing potential of *Vateria indica* resin exposed about 12.63% at 20µg/mL and 40µg/mL showed 18.68%. While the concentrations of 60, 80 and 100µg/ml exhibited gradual percentage of 27.83, 30.58 and 36.26% of reduction proficiency. The ethanolic extracts of *Vateria indica* resin showed the free radical scavenging activity.

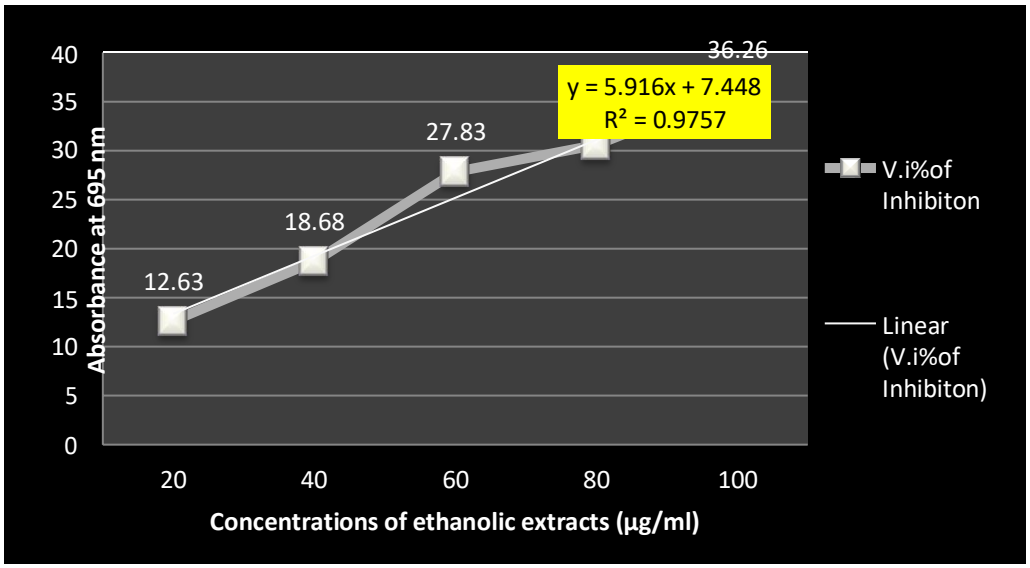
Gupta *et al.*, (2012) showed the *Vateria indica* stem bark extracts contain a good amount of phenolic and flavonoid content and can be used as a natural source antioxidant agents. The reduction power of VIE stem bark using ethanol was dose dependent, and at a concentration of 500 mg mL, VIE had the most significant reducing power. VIE and ascorbic acid had IC50 values of 419.16 mg/ml and 374.24 mg/ml, respectively. Alshabi *et al.*, (2022), showed the free radical scavenging activity

(DPPH): VIE' stem bark using ethanol by DPPH scavenging action was concentration-dependent, increasing linearly from 20 to 200 µg mL^{-1}. VIE scavenging activity peaked at 200 µg mL^{-1} (86.36% inhibition), and Standard antioxidant ascorbic acid scavenging activity peaked at 200 µg mL^{-1} (95.40% inhibition).VIE and ascorbic acid showed IC_{50} values of 96.91 µg/ml and 68.13 µg/ml, respectively.

Table: 2. Inhibition percentage of anti-oxidant potential of ethanolic extract in *Vateria indica* by Total Anti-oxidant Activity.

Total Anti-oxidant Activity (PHOSPHOMOLYBDENUM ASSAY)							
Sample Code	**Concentrations (µg/ml)**	**OD-I**	**OD-II**	**OD-III**	**Mean OD**	**%of Inhibiton**	**IC 50 Value (µg/ml)**
Vateria indica resin	20	0.21	0.25	0.23	0.23	12.63	50.98
	40	0.36	0.32	0.34	0.34	18.68	
	60	0.49	0.51	0.52	0.51	27.83	
	80	0.56	0.59	0.52	0.56	30.58	
	100	0.69	0.68	0.61	0.66	36.26	

Figure: 2. Total Anti-oxidant activity exhibited by *Vateria indica* resin using ethanol at different concentration.



CONCLUSION

The results obtained in the present study indicate that *Vateria indica* resin extracts contain a natural source of antioxidant that could have great importance as therapeutic agents in preventing or slowing the progress of aging and age associated oxidative stress related degenerative diseases. This plant has the potential to treat various disorders, so it is a useful plant for mankind in many ways.

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