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Anti-oxidant property of *Ailanthus excelsa* Roxb used by local tribes of Pocharam wildlife sanctuary, Medak and Nizamabad districts, Telangana

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Abstract

The present study deals with the anti oxidant activity of *Ailanthus excelsa* Roxb used by Yerukula and Lambadi ethnic tribal living in Pocharam Wildlife Sanctuary of erstwhile Medak and Nizamabad Telangana, India. These people live in harmony with Nature and they employ plant and their derivatives for the basic health needs. Phytochemical analysis revealed the presence of numerous secondary metabolites of potential medical use. DPPH, Nitric Oxide, Superoxide, Hydrogen peroxide scavenging activity of methanol leaf extracts at different concentrations were studied (ascorbic acid used as standard). The present study revealed the anti oxidant activity of the leaf extracts of selected plants at all concentrations tested.

Keywords: *Ailanthus excelsa*, yerukula, lambadi, anti oxidant activity, pocharam wildlife sanctuary

Introduction

The Mother Nature has been the repertoire of all the sources of mankind and it ranges from habitat to food, drugs, dyes, furniture, cosmetics, textiles and other crude or processed products of food, economic and health value with significance. India is the habitat of diversified medicinal herbs ^[1]. Most of the indigenous plants have been a source of several bio active compounds with therapeutic usage in treating the ailments of mankind and his livestock. The system of traditional medicine and human cultural evolution has grown and evolved hand in hand mode and ultimately they became inseparable and an integral part of civilization and lifestyle. The diet, and every other components of mankind is of plant derived one. The knowledge of these medicinal plants has been transmitted over generations and it almost became a hereditary property. Availability, outreach, and eco friendly nature of these systems made it one of the oldest surviving sciences even in the modern era.

More over the change in diet, lifestyle and other issues like stress and many anthropogenic activities like industrialization made the renaissance of traditional system of Indian medicine. The side effects, resurgence and recurrence of many diseases with antibiotic resistance are alarming the existence of mankind and made the world to run behind the ancient knowledge. Recent outbreak of many epidemic and pandemics resulted heavy in roads in to Ayurvedic and herbal based treatment with more efficacy and minimal side effects again ^[2].

Free radicals are highly reactive electron rich species, they cause damage to DNA strands, results in formation of peroxides and ultimately culminates in several health issues and degenerative diseases like cancer, inflammation, atherosclerosis, accelerated ageing etc. Plants are rich sources of natural antioxidants ^[3].

In developing third world countries the problem of infectious disease prevalence is more and the clinical expenditure is not affordable. Moreover the problem of antibiotic resistance, its management is a great matter of concern. Therefore there is need to discover and develop new drugs that can inhibit, prevent the growth and propagation of microbes.

Ailanthus excelsa Roxb member of Simaroubaceae family. *Ailanthus excelsa* Roxb. (Simaroubaceae) is commonly known as Peddamanu or Mahanimba because of its resemblance with the Neem tree (*Azadirachita indica*) and Maha-rukha because of its tallness. *Ailanthus* word taken from "ailanto which means that tree of heaven" and is the name for one of the species within the Moluccas, whilst in Latin "excelsa means tall". The plant is recognized by various names like tree of heaven in English. *Ailanthus excelsa* is a tall (18-25 m) deciduous tree, shoot straight, light grey coloured and smooth textured bark is present, turns into grey-brown colour and texture becomes rough on large- trees, smell light aromatic and tastes slightly bitter. Leaves arranged in alternate manner, pinnately- compound leaf, large (30-60 cm) leaflets are 8-14 or more pairs. Flower clusters droop at leaf bases, many flowers present, mostly dioecious, Fruit (1-seeded), lance shaped, flat, pointed at ends, 5 cm long, 1 cm wide, copper red, strongly veined, twisted at the base.

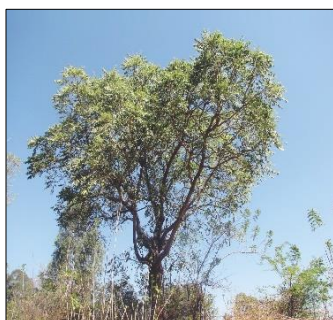
It is being used on a wider range by the Yerukula and Lambadi ethnic tribes inhabiting in and around Pocharam wild life sanctuary. A wildlife sanctuary is an area where animal habitats and their surroundings are protected from any sort of disturbance. The capturing, killing and poaching of animals is strictly prohibited in these regions. They aim at providing a comfortable living to the flora and fauna. India has beautiful wildlife sanctuaries, with dense forests, large rivers, high and beautiful mountains. Tourism is not

permitted in a wildlife sanctuary. People are not allowed unescorted there. The main objective of establishing a wildlife sanctuary is to educate humans as to how to treat the animals. The animals are taken care of and allowed to live peacefully in their natural habitats.

Many people reviewed the status of nutritional and therapeutic value of *Ailanthus excelsa* [4, 5, 6]. Antioxidant nature of *Ailanthus excelsa* has been studied [7]. Phenolic, flavonoid contents, and free radical scavenging activity of *ailanthus excelsa roxb* have been studied [8]. The antioxidant property of some selected medicinal plants has been reported from Telangana [9]

Ailanthus excelsa can be considered as one of the quick developing tree and is appreciably cultivated in various parts of India within the location of villages; it is far cultivated as a street tree for its deep coloration and may be used for ant-erosion purposes. The bark was widely used in "Asian and Australian medicinal drugs" to resist worms, heavy vaginal discharge and allergies, malaria [10, 11]. In Africa Ailantic acid cramps, gonorrhea epilepsy, tape warm infestation and high blood pressure was healed by using this plant [12].

In Konkan the leaves juice is commonly added into the khir, or the fresh bark juice is given with coconut juice and treacle or with aromatics or honey to forestall after pains. It is also used wounds & skin eruptions therapy. The plant is used as herbal antifertility agent by the Irula girls in Mavanahalla place of the Nilgiri district in Tamil Nadu.



Ailanthus excelsa Roxb TREE



Ailanthus excelsa Roxb-Bark



Ailanthus excelsa Roxb-Leaf



Ailanthus excelsa Roxb-Fruit

Materials and Methods

Study site

The Pocharam Lake was built in Pocharam across Allair, a tributary of Manjeera River. It was established in 1952, it is

located at latitudes 18°.6' to 18°.18'N and longitudes 78°.8' to 78°.20'E. It has spread in an area of 129.85 sq km in erstwhile Medak and Nizamabad districts of Telangana. Tremendous biotic pressure, deforestation, indiscriminate grazing and outbreak of fire and diseases are some of the threats to this wild life sanctuary. It receives Southwest monsoon (June to September).

Phytochemical Analysis

Phytochemical screening was carried out by following standard procedure to assess the qualitative chemical composition of crude extracts and to ascertain major natural chemical groups such as alkaloids, Terpenoids, steroids, flavonoids, tannins, carbohydrates and amino acids. Qualitative phytochemical analyses of the extracts were performed [13].

DPPH radical scavenging activity

The total anti-oxidant potential was determined by Brand-Williams *et al.*, and Parejo *et al.*, [14]. Various concentrations of test sample were prepared by serial dilution and 0.1 mL of each dilution was added to 3.9 mL of a 6.0×10^{-5} μ M

methanol solution of DPPH, followed by vortexing. The reaction was allowed to take place in the dark at room temperature to reach a plateau.

The decrease in the absorbance was measured at 517 nm was determined by using a Shimadzu spectrophotometer. The concentration of remaining DPPH in the reaction medium was calculated from the calibration curve as follows:

$$\text{Scavenging effect (\%)} = \frac{(1 - A_{\text{Sample (517nm)}})}{A_{\text{Control (517nm)}}} \times 100$$

Super oxide free radical scavenging activity

Different concentrations of 50, 100, and 150 µg/mL (10, 20, 30 µL) of plant extracts were taken and the volume was made up to 150 µL with methanol, to each of this, 100 µL of riboflavin, 200 µL EDTA, 200 µL methanol and 100 µL NBT was mixed in test tubes and further diluted up to 3 mL with phosphate buffer and absorbance was measured after illumination for 5 min, at 590 nm on UV visible spectrophotometer (Shimadzu, UV-1601), Japan and results were compared with ascorbic acid (10 µg/mL as standard).

Scavenging of nitric oxide

Sodium nitroprusside (5 µM) in standard phosphate buffer solution was incubated with different concentration of the test extracts dissolved in standard phosphate buffer (0.025 M, pH 7.4) and the tubes were incubated at 25 °C for 5 h. After 5 h, 0.5 mL of incubation solution was removed and diluted with 0.5 mL Griess reagent (prepared by mixing

equal volume of 1% sulphanilamide in 2% phosphoric acid and 0.1% naphthyl ethylene di amine dihydro chloride in water). The absorbance of chromophore formed was recorded at 546 nm.

The control experiment was also carried out in similar manner, using distilled water in the place of extracts. The activity was compared with ascorbic acid.

Scavenging of hydrogen peroxide

A solution of hydrogen peroxide (20 mM) was prepared in phosphate buffered saline (PBS, pH 7.4). Various concentrations of 1 mL of the extracts or standards in methanol were added to 2 mL of hydrogen peroxide solutions in PBS. The absorbance was measured at 230 nm, after 10 min against a blank solution that contained extracts in PBS without hydrogen peroxide. IC₅₀ value is the concentration of the sample required to scavenge 50% free radical.

The percentage inhibition was calculated by using the following formula.

$$\text{Scavenging activity (\%)} = \frac{\text{OD of control} - \text{OD sample}}{\text{OD of control}} \times 100$$

Results and Discussion

Phytochemical screening of *Ailanthus excelsa* extracts revealed the presence of different secondary metabolites of pharmacological significance and the results were presented in table no. 1.

Table-1. Phytochemical screening of *Ailanthus excelsa*

1.	Flavonoids	-
2.	Alkaloids	+
3.	Terpenoids	+
4.	Tannins	+
5.	Carbohydrates	+
6.	Glycosides	+
7.	Amino acids and proteins	+
8.	Phenols	+
9.	Steroids	+
10.	Saponins	+

Table 2: Anti oxidant activity of *Ailanthus excelsa* [All values in this table represent the mean±SD (n=6)]

<i>Ailanthus excelsa</i>	Extract 50 µg/ml	Extract 100 µg/ml	Extract 150 µg/ml	Standard 10 µg/ml
DPPH	57±0.17	58±0.21	58±0.34	61±0.33
Superoxide	20±0.11	27±0.11	31±0.54	43±0.71
Nitric Oxide	49±0.12	54±0.41	58±0.64	61±0.10
Hydrogen Peroxide	21±0.34	24±0.34	34±0.34	42±0.47

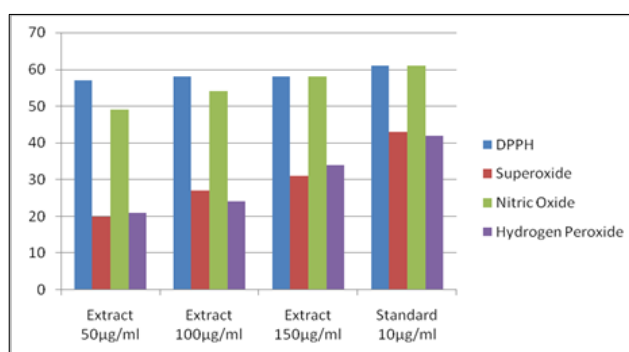


Fig 1: Anti oxidant activity of *Ailanthus excelsa*

In the present study, DPPH scavenging activity revealed the leaf extracts of *Ailanthus excelsa* possesses scavenging activity at the studied concentrations and is presented in Table no-2 and Figure no-1).

Pairing of unpaired electrons results in neutralization and converts it into 1-1 di phenyl-2- picryl hydrazine and becomes colorless from purple color. The DPPH radical was measured at 517 nm. DPPH, Superoxide, Nitric oxide, Hydrogen Peroxide scavenging activity of *Ailanthus excelsa* methanol leaf extracts at different concentrations measured [ascorbic acid (10 µg/ml) was used as standard].

The present study revealed that the *Ailanthus excelsa* methanol leaf extracts were observed for significant reduction of the super oxide anions and they inhibited the formation of formazan.

Scavenging of H₂O₂ is due to the presence of phenolic compounds; they donate electrons and convert peroxides into water. Antioxidant activity is due to phenolic compounds even may be due to terpenoids. Hydrogen peroxide can penetrate membranes of cell and reacts with Fe²⁺ and possibly Cu²⁺ ions and results in hydroxyl radical and subsequently it results in toxic effects. Free radicals stimulate peroxidation of polyunsaturated lipids.

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