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RESEARCH ARTICLE

Preliminary Phytochemical Analysis and *In vitro* Antioxidant Activity of *Baccaurea courtallensis*

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ABSTRACT:

Different parts of wild plants are still utilized as a nutrient supplement across the world, particularly during the period of famine. In India, wild plants are extensively distributed in the forest areas and occupy a part of tribal culture and traditions. *Baccaurea courtallensis (Wight) Muell. Arg.* (Family: *Euphorbiaceae*) is an evergreen tree widely distributed in Western Ghats. It has been enlisted in the endangered species. Conventionally, *B.courtallensis* is used for treating diarrhoea, diabetes, dysentery, skin infections, piles and mouth and stomach ulcers. The present study was focused to perform preliminary phytochemical screening and to evaluate antioxidant activity of *B.courtallensis* by 2,2-diphenyl-1-picryl-hydrazyl-hydrate (DPPH) method. The extractions were carried out with the leaves of *B.courtallensis* using ethanol. The results revealed the presence of terpenoids, glycosides, reducing sugar, phenols, flavonoids, alkaloids, saponins, phenols and tannins in the extract studied. Further, the extract exhibited potent free radical scavenging activity with an IC_{50} value of 24.41 µg/ml. The investigation has suggested that these wild plants could be a source of potential drugs.

KEYWORDS: *B.courtallensis*, Phytochemicals, DPPH, Endangered, Wild plants.

INTRODUCTION:

From time immemorial, wild plants make an exemplary contribution to tribal and rural communities by providing them food, shelter and medicine. They have become a part of their cultural traditions. Both cultivable plant species and wild plants are rich in different classes of phytochemicals[1]. These phytochemicals through their defence action protects plants from various diseases. Ethnobotanical knowledge on wild plants has guided researchers to explore for novel drugs[2]. Increased demand of plant-derived drugs results in the unregulated trading of medicinal plants, in particular wild plants. This unsustainable usage and overexploitation threatens wild plants to be at the verge of endangered[3]. As a result, several strategies have been suggested for conservation of wild plants.

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India is popular for its richest and diverse spectrum of plants growing in the wild. These wild plants are consumed along with domesticated plants in different regions of the country. "*Baccaurea courtallensis (Wight) Muell. Arg.* is a wild plant indigenous to Western Ghats of India. The plant belongs to the family Euphorbiaceae and found in the evergreen and semi evergreen forest up to an altitude of 900 m. It is distributed from South Konkan to South Kerala and western parts of Tamil Nadu[4]. It is popularly known as Kolikukku in Karnataka and Mootipazham, Mootippuli, Mootti and onapazham in Kerala. It is a medium-sized tree growing up to a height of 8-10 m. The tree bears shining leaves and crimson-red fruits on the trunk and also on the exposed roots. The fruits occur as clusters and are acidic". Local tribal people such as kanikkar, Malampandarangal and Paniyar consume ripe fruit for its medicinal properties. Fruit rind is pickled and leaves are cooked like side dishes and consumed with rice or rice soup in their daily life. "*B.courtallensis* blooms during the month of February-March and the fruits mature during the month of May-June. *B.courtallensis* is monoecious and shows

pendulous inflorescence". It propagates through seeds. However, International Union for Conservation of Nature and Natural recourses (IUCN) has enlisted *B.courtallensis* as threatened species. In Kerala, *B.courtallensis* is used extensively in folklore medicine. Different parts (root, stem, leaf and fruit) of the plant have diverse uses. The paste of root and leaves are mixed with hot water and taken internally to treat piles. In addition the roots are used for treating diabetes and for relieving headache. Fruits deal with sterility and mouth and stomach ulcers. Leaves stem and roots together act as antidote[4-8].

To validate the traditional medicinal value, the present study focuses on the preliminary phytochemical investigations and *in vitro* antioxidant activity of *B.courtallensis*, a rare wild plant widely distributed in Southern India and predominantly used by tribes for various ailments.

MATERIALS AND METHODS:

The leaves of *B.courtallensis* Linn were collected from Thrissur, Kerala in the month of January 2019. The plant material was identified and authenticated by Dr. P. Jayaraman, Plant Anatomy Research Center, Tambaram, Chennai. Leaves of *B.courtallensis* were shade dried for few days and powdered using the mixer grinder. Then the crude powder was extracted with ethanol (60°-80°C) using soxhlet apparatus by continuous hot percolation method. After extraction it was filtered and then the solvent was removed. The dried extract was weighed and stored at -4 ◦C.

Determination of plant yield:

The percentage yield was obtained using this formula W2 –W1/W0 × 100. Where W2 is the weight of the extract and the container, W1 is the weight of the container alone and W0 is the weight of the initial dried sample.

Preliminary phytochemical screening:

The ethanol extract of leaves of *B.courtallensis* was subjected to preliminary phytochemical screening following standard methods[9].

In vitro antioxidant activity-DPPH free radical scavenging assay:

The antioxidant activity of the ethanol extract of *B.courtallensis* was evaluated by DPPH free radical scavenging assay. Stock sample solution was prepared at a concentration of 100µg/ml. The test samples were prepared from stock solution by dilution with methanol to attain a concentration range of 20-100 µg/ml. DPPH solution (0.004% w/v) was freshly prepared and added to each of the test tube containing *B.courtallensis* extract and the absorbance was read at 517 nm after 20 minutes. Ascorbic acid, DPPH solution and 95% methanol were used as positive control, control and blank respectively. Measurement of percent scavenging of the DPPH free radical was carried out by using the following equation:

% DPPH radical scavenging = [(Absorbance of control – Absorbance of sample) / Absorbance of control] x100.

IC_{50} value was then calculated from the graph plotted with percentage of radical scavenging activity against respective concentrations.

RESULTS:

Extraction is the principal step in medicinal plants analysis. In the present study, about 5.69% extract was obtained from the leaves of *B.courtallensis* by hot percolation method using ethanol as solvent.

The phytochemical screening revealed the presence of terpenoids, glycosides, reducing sugar, phenols, flavonoids, alkaloids, saponins, phenols and tannins in the extract studied (Table 1).

Table 1: Phytochemical screening of *B.courtallensis* leaves

S. No	Phytochemicals	Test	*B.courtallensis* leaves
1	Alkaloids	Wagner's test	+
2	Carbohydrates	Fehling's test	+
3	Glycosides	Keller-Kiliani test	+
4	Saponins	Foam test	+
5	Phytosterol	Libermann Burchard's test	+
6	Phenols	Ferric chloride test	+
7	Tannins	Gelatin test	+
8	Flavonoids	Alkaline reagent test	+
9	Protein and amino acid	Xanthoproteic test	+
10	Terpenoids	Salkowski's test	+

+: Presence; -: Absence

The scavenging activity of *B.courtallensis* leaf extract and ascorbic acid are displayed in Figure 1. It can be noted that the ethanol extract exhibited a concentration dependent radical scavenging activity against DPPH with an IC_{50} valueof 24.41µg/ml while the standard ascorbic acid was observed to exhibit an IC_{50} value of 14.19µg/ml (Table 2).

Table 2: In vitro free radical scavenging activity of *Baccaureacourtallensis*

Concentration (µg/ml)	% DPPH radical scavenging activity (Mean±SEM) of triplicates	
	Sample	Ascorbic acid
20	48.86±0.13	51.13±0.26
40	52±0.23	56.56±0.16
60	62.8±0.2	61.2±0.26
80	65.4±0.13	66.63±0.19
100	69.4±0.23	70.63±0.21

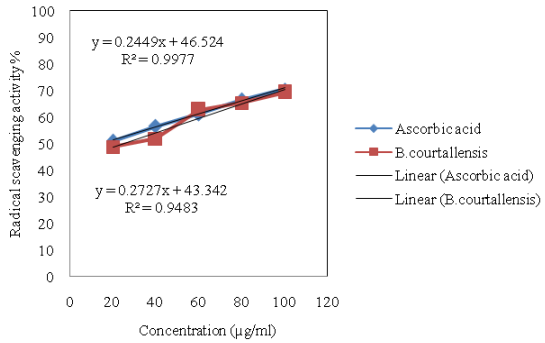

Figure 1: DPPH free radical scavenging assay

DISCUSSION:

Biological activities of plants are merely dependent on its phytochemicals. For instance glycosides are reported to have anti-inflammatory, antimicrobial, antiviral, antioxidant and anticancer activities. There are 11 classes of glycosides including anthraquinone, chromone, cardiac, saponin and steviol glycosides[10]. Phenolic compounds possess aromatic ring and is widely distributed among the plant communities[11]. They include several compounds including simple phenolic acids to complex flavonoids[12]. "They possess anti-apoptotic, anticarcinogenic, anti-inflammatory and anti-aging properties". They also found to exhibit cardiovascular protection and endothelial function improvement[11]. Alkaloids are one of theubiquitous plant metabolites and are employed as "local anesthetics, narcotics, analgesics and cardiac, uterine, and respiratory stimulants". "They showed antibacterial, antioxidant, anticholinesterase, antiparasitic, anti-HIV, and anti-inflammatory activities". They raise blood pressure, dilate pupils, and relax skeletal muscles. They are also utilized to treat cardiovascular and metabolic disorders[13]. Phytosterols include sitosterol, stigmasterol and campesterol and perform an incredible role in the structure and function of cell membranes. Plant sterol reduces cholesterol level by lowering cholesterol absorption[14]. Phytochemicals such as phenols and flavonoids due to their redox property scavenges free radicals and hence have positive correlation with antioxidant activity. Previous reports suggested the presence of phytochemicals such as tannins, saponins, terpenoids, flavonoids, phenols and quinonesin different parts of *B.courtallensis*[15]. Seeds of *B.courtallensis* were also found to be rich in voltatile oils[4]. Other species of the genus Baccurea were reported to be rich in phytochemicals. For instance, *B.angulata* fruit extract was observed to contain higher total phenolic content, total flavonoid content and total carotene content and showed remarkable antioxidant activity when compared with the standard ascorbic acid[16]. Similarly *B.ramiflora* leaf extract were found to have higher polyphenolic content and scavenges DPPH radical with IC_{50} value of 23.83µg/ml[17]. Our study demonstrates the presence of these phytochemicals and hence it might be the reason for its greater antioxidant potential. Hence *B.courtallensis* can act as an excellent and promising source of phytochemicals capable of combating oxidative stress related conditions. However, further investigations have to be carried out to get in depth knowledge on the bioactive compounds of these plants.

AUTHORS CONTRIBUTIONS:

All authors have equal contribution in bringing out this article.

CONFLICT OF INTEREST:

None.

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