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RESEARCH ARTICLE

ANTIOXIDANT POTENTIAL OF LEAF EXTRACT OF *Peltophorum pterocarpum*(DC.)Baker ex.K. Heyne

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ABSTRACT

Antioxidants prevents oxidative damage caused by free radicals and can be used in cardiovascular and anti-inflammatory diseases. The presence of natural antioxidants in plants is well known. The present study is undertaken to evaluate the phytochemical constituents, total phenol, total flavonoid and anti-oxidant activity of the plant Peltophorum pterocarpum. The extracts of leaves of *P. pterocarpum* contains terpenoids, flavanoids, steroids, phenols, cardioglycosides, quinines, coumarins and tannins. Presence of these phytochemicals have ability for curing various ailments and possess potential anti-inflammatory, antimicrobial and antioxidant activities. The in-vitro antioxidant activity was determined by the method of DPPH radical scavenging assay. The result shows that ethanolic extract of *P. pterocarpum* leaves had highest antioxidant activity (94%) using DPPH method. Thus the in-vitro studies clearly indicate that the leaves extract of *P. pterocarpum* shows significant antioxidant activity which would be helpful in prevention of various oxidative stresses.

Keywords: Peltophorum pterocarpum , Antioxidant, DPPH.

INTRODUCTION

Antioxidants are compounds that can delay or inhibit the oxidation of lipids or other molecules by inhibiting the initiation or propagation of oxidizing chain reaction. The antioxidant activity of polyphenols is mainly due to their redox properties, which can play an important role in adsorbing and neutralizing free radical, quenching oxygen, or decomposing peroxides. Antioxidant activities of polyphenols have been suggested to exert beneficial pharmacological effects on neurological disorder on the basis of in vitro studies [1, 2].

Antioxidants from natural source play a paramount role in helping endogenous antioxidants to neutralize oxidative stress. Many clinical, epidemiological, and experimental data suggest that antioxidants from plants have beneficial effect on prevention of many chronic diseases [3, 4]. As a result, there has been a keen interest in evaluating the role of bioactive constituents from medicinal plants in reducing the risk of diseases such as cancer, hypertension, cardiac infarction, arteriosclerosis, rheumatism, cataracts and others.

Edible and non-edible plants commonly have phenolic compounds, and have multiple biological effects, including antioxidant activity. The antioxidant activity of phenolic compounds is mainly due their redox properties, which allow them to act as reducing agents, hydrogen donators, and singlet oxygen quencher. In addition, they have a metal chelation potential [5].

Peltophorum pterocarpum (Copperpod, Golden Flamboyant, Yellow Flamboyant, Yellow Flame Tree, Yellow Poinciana and Radhachura in Bangla; Synonyms: Peltophorum inermis and Peltophorum ferrugineum) is a family of Fabaceae native to tropical southeastern Asia and a popularly ornamental tree grown around the world. It is a deciduous tree growing to 15–25 m (rarely up to 50 m) tall, with a trunk diameter of up to 1m.

The leaves are bipinnate, 30-60 cm long, with 16-20 pinnae, each pinna with 20-40 oval leaflets 8-25 mm long and 4-10 mm broad. The flowers are yellow, 2.5-4 cm in diameter, produced in large compound racemes up to 20 cm long. The fruit is a pod 5-10 cm long and 2.5 cm broad, red at first, ripening black, and containing one to four seeds. Trees begin to flower after about four years (6, 7).

The plant is native to tropical southeastern Asia and northern Australasia, in Sri Lanka, Thailand, Vietnam, Indonesia, Malaysia, Papua New Guinea, Philippines and the islands of the coast of Northern Territory, Australia [6, 8]. The plant is also found in different regions of India including Birbhum District, West Bengal. The wood of the plant is wide variety of uses, including cabinet-making [9] and the foliage is used as a fodder crop [6].

Different parts of this tree are used to treat many diseases like stomatitis, insomnia, skin troubles, constipation, ringworm and its flower extract is known to be a good sleep inducer and used in insomnia treatment [10-12]. Its bark is used as medicine for dysentery, as eye lotion, embrocation for pains and sores. The traditional healers use the leaves in the form of decoction for treating skin disorders. Stem infusion of *P. pterocarpum* (DC.) Baker ex K. Heyne used in dysentery for gargles, tooth powder and muscular pain [13]. Flowers are used as an astringent to cure or relieve intestinal disorders after pain at childbirth, sprains, bruises and swelling or as a lotion for eye troubles, muscular pains and sores [14].

The taxonomical classification of Peltophorum pterocarpum is given below:

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Sub-class	Rosidae
Order	Fabales
Family	Fabaceae
Sub-family	Caesalpinioideae
Genus	Peltophorum
Species	*pterocarpum*

MATERIALS AND METHODS

Fresh leaves of *P. pterocarpum* were collected from localities of Chennai. The plant was authenticated at Plant Anatomy Research Centre (PARC) Tambaram, Chennai. The leaves were washed thoroughly with normal tap water followed by sterile distilled water. Then the leaves were shade dried at room temperature. These were crushed to powder using grinding machine.The powdered sample was analysed for qualitative inorganic compounds.

Preparation of extracts

Preparation of the extracts was following the standard methods [15, 16]. About 15 g of fine dried powdered leaves of *P. pterocarpum* were extracted with 150mL of ethanol (75%), acetone, Chloroform, petroleum ether and aqueous extract for 1 min using an Ultra Turax mixer (13,000 rpm) and soaked overnight at room temperature. The samples were then filtered

through Whatman No.1 paper in Buchner funnel. The filtered solution was evaporated under vaccum in a rota-evator at 40°C and then dissolved in respective solvents. The concentrated extracts were stored in airtight container in refrigerator below 10°C.

QUALITATIVE ANALYSIS OF ANTIOXIDANT ACTIVITY OF *P. pterocarpum* LEAVES

The antioxidant activity of leaves extracts of *P. pterocarpum* was determined by standard method [17, 18]. 50 µL of leaves extracts of *P. pterocarpum* were taken in the microtiter plate. 100 µL of 0.1% methanolic 1, 1-diphenyl-2-picrylhydrazyl (DPPH) was added over the samples and incubated for 30 minutes in dark condition. The samples were then observed for discoloration, from purple to yellow and pale pink were considered to be strong and weak positive respectively. The antioxidant positive samples were subjected for further quantitative analysis.

QUANTITATIVE ANALYSIS OF FREE RADICAL SCAVENGING ACTIVITY OF *P. pterocarpum* LEAVES

The antioxidant activities were determined using DPPH, (Sigma-Aldrich) as a free radical. Leaves extract of 100 µL were mixed with 2.7 mL of methanol and then 200 µL of 0.1% methanolic DPPH was added. The suspension was incubated for 30 minutes in dark condition. Initially, absorption of blank containing the same amount of methanol and DPPH solution was prepared and measured as a control (19). Subsequently, at every 5 minutes interval, the absorption maxima of the solution were measured using a UV double beam spectra scan (Chemito, India) at 517 nm. The antioxidant activity of the sample was compared with known synthetic standard of (0.16%) of butylated hydroxy toluene (BHT). The experiment was carried out in triplicates.

The capacity of scavenging free radicals activity was calculated by the formula

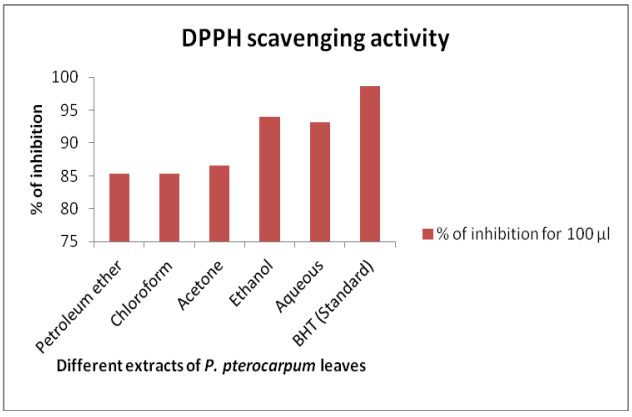
Scavenging activity (%) = (A of Control-A of Sample)/A of Control ×100

RESULTS AND DISCUSSION

Table 1: DPPH scavenging activity of leaves extract of *Peltophrum pterocarpum* .

Leaves extracts of *P. pterocarpum*	% of inhibition for 100 µl
Petroleum ether	85.3
Chloroform	85.3
Acetone	86.6
Ethanol	94
Aqueous	93.2
BHT (Standard)	98.6

Figure 1: DPPH scavenging activity of leaves extract of Peltophrum pterocarpum



DISSCUSSION

The results of Antioxidant activity were done for all the five, pet ether, chloroform, acetone, ethanol and aqueous extracts. The ethanolic extract from leaves of *P. pterocarpum* showed a high antioxidant activity.

The percentage of DPPH radical scavenging activity of leaves extracts of *P. pterocarpum* from five different solvent extracts is shown in Fig. 1. The results revealed that among five different solvent extracts of *P. pterocarpum*, the ethanolic leaves extract had maximum DPPH radical scavenging activity (94%), when compared with that of synthetic antioxidant BHT as a positive control (98.6%). In this studies, ethanolic leaves extracts recorded higher percentage of free radical scavenging activity followed by aqueous, acetone, chloroform and petroleum ether.

There is a strong need for effective antioxidants from natural sources as alternatives to synthetic antioxidant in order to prevent the free radicals implicated diseases which can have serious effects on the cardiovascular system, either through lipid peroxidation or vasoconstriction. The various solvents extracts of leaves of *P. pterocarpum* have been investigated for their antioxidant activity. Secondary metabolites such as polyphenols are not required for plant development and growth, but are involved in plant communication and defence (20-21). Polyphenols interact with pathogens, herbivores, and other plants; they protect from ultraviolet radiation and oxidants, repel or poison predators and attract beneficial insects or microbes (22-23). Therefore, in this study, the antioxidant properties of the leaves of *P. pterocarpum* examined for DPPH radical scavenging activity according to the method described and the results of the screening are shown in table 1 as comparable with known antioxidant BHT. In terms of antioxidant activity, all the extracts investigated exhibited a rather high degree of activity (more than 80%). In particular, ethanol extract of the leaves of *P. pterocarpum* displayed the highest activities (94%) as antioxidant activity as removal of the stable radical DPPH.

The preliminary antioxidant findings of leaves extract may provide the base for selection and isolation of new plants having bioactive compound like phenols which has strong antioxidant activity. There are number of reports that proved that phenols have scavenging ability due to the presence of hydroxyl group. It was also reported they are effective hydrogen donors and the position and degree of hydroxylation of phenolic compounds especially in the Bring play a major role make them excellent antioxidants (24). In the present study, ethanolic extract of *P. pterocarpum* have notable antioxidant, free radical scavenging activities. These studies showed that this plant extract could be a new potential source of natural antioxidants which may contributing in the prevention of various degenerative diseases which are very common nowadays.

CONCLUSION

On the basis of the results obtained in the present study, it is concluded that ethanolic extract of *P. pterocarpum* exhibits high antioxidant and free radical scavenging activities. It also chelates iron and has reducing power. These *in vitro* assays indicate that this plant extract is which might be helpful in preventing the progress of various oxidative stresses.

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