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Original Article

Antioxidant perspective of selected medicinal herbs in India: A probable source for natural antioxidants

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ABSTRACT

Objective: To analyze the phytochemical and radical scavenging activities of leaf fractions of commonly used 6 medicinal plants in India.

Methods: The plant leaves were extracted with 80% methanol. The methanolic extracts were subjected to total flavonoids and phenolics estimation. Antioxidant activities of the extracts were determined by DPPH (2,2-diphenyl-1-picrylhydrazyl) and FRAP (Ferric ion reducing antioxidant power) assay.

Results: Our results showed that *Phyllanthus amarus* had higher levels of flavonoids (57.18 mg/100 g) and phenolics (46.92 mg/g). All the extracts showed significant antioxidant activity. The highest DPPH radical scavenging activity was found in *Leucas aspera* (75.06%) followed by *Coleus aromaticus* (72.26%). The highest FRAP value was observed in the *P. amarus* (12.68 mM/g) whereas *L. aspera* (2.11 mM/g) showed the lowest. The results suggest that the secondary metabolites like polyphenolics and other compounds present in these plants may contribute to the medicinal properties of that plant.

Conclusions: The results concluded that *P. amarus* have relatively more phytochemical content and showed significant antioxidant activity. Our finding is a prologue for characterization and isolation of antioxidant components from the medicinal plants and *invitro* and *invivo* studies are essential to use it as a potential source of natural antioxidants.

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1. Introduction

In ancient times, humans were healthy, having more immune power; the main reason for their better health was may be due to their life style and food habits. In prehistoric times, people took food as medicine. Tribals depend on the medicinal plants on their day-to-day life starting from food to health care.¹ The ethno botanical reports provide the information on importance of several medicinal plants like *Phyllanthus amarus*,

Leucas aspera etc.² In olden days, different medicinal plant species have been used for the treatment of human ailments ranging from fever to cancer. But now the concept is shifted to 'Medicine as food' due to the fast food culture by the modern societies.³ In the modern era, the changing life style of the present generation forms the basis for the occurrence of many new diseases that is challenging the day-to-day life of the humans. Even with the discovery of many novel drugs that can cure the disorders, the affordability, especially for those in

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developing countries is the major limitation. For the past two decades, humans were in search of effective drugs that will combat deadly diseases without any side effects.

Free radicals are responsible for the etiology of high number of chronic and degenerative diseases. Free radicals are highly active, unstable compounds due to the presence of unpaired electron in their outer shell, which are produced as result of cellular metabolism. Lipid peroxidation depicts the cellular injury and oxidative stress damage.⁴ Antioxidants present in the human body protect during oxidative stress. There is a long history of medicinal usage of plants for the treatment of human disorders. Plants possess many secondary metabolites, which render beneficial properties to humans.⁵ Phytochemicals are the secondary metabolites produced by plants that are responsible for the smell, color and flavor of fruits/vegetables/plant foods. Phytochemicals present in the plants are reported to have antioxidants properties that will prevent the oxidative chain reaction initiated by the free radicals and counteract the damaging effects of reactive oxygen species (ROS) produced within the organism from molecular oxygen.⁶ Earlier food was viewed only as a primary source of nutrition to meet our daily minimum requirements for basic survival, but now interest is shifted more toward identifying/improving the functionality of food. Hence, the aim of the present study is to scientifically evaluate the antioxidant properties of 6 commonly used medicinal plants in India.

2. Materials and methods

2.1. Sample collection

The medicinal plants used in the present study (*Andrographis paniculata*, *Cissus quadrangularis*, *C. aromaticus*, *L. aspera*, *Ocimum americanum*, *P. amarus*) were authenticated by Prof. S. Ramachandran, Taxonomist, Department of Botany, Bharathiar University, Tamil Nadu, India.

2.2. Preparation of extracts

The leaves from the plants were collected and cleaned with distilled water. The leaf samples (1 g) were weighed and homogenized in 10 ml of methanol in a mortar and pestle. The samples were then centrifuged at 4000 rpm for 10 min. The above procedure was repeated twice and the extracts were collected and stored for the further analysis.

2.3. Phytochemical content and radical scavenging analysis

The total flavonoid content in the extract was estimated by aluminum chloride method.⁷ The total phenolic content was quantified by Folin–Ciocalteu method and the values were expressed in gallic acid equivalents (GAE).⁸ The DPPH radical quenching ability of the leaf vegetable extracts was measured at 517 nm.⁹ The ability of the plant extracts to reduce the ferrous ions was measured using the method of Benzie and Strain.¹⁰

2.4. Statistical analysis

All the experiments were repeated 3 times and the results represented are the means of 3 replicates \pm SD.

3. Results and discussion

3.1. Phytochemical content

The total flavonoid content of all the medicinal plants was evaluated and the results expressed in quercetin equivalents (Fig. 1). The results showed considerable total flavonoids content in all the plants tested. Total flavonoid content of the selected 6 medicinal plants showed significant variation, ranging from 49.72 to 57.18 mg Quercetin (QE)/100 g fresh weight with an overall mean of 53.63 mg QE/100 g. *P. amarus* showed the highest flavonoid content (57.18 mg QE/100 g) while it was lowest in *C. aromaticus* (49.72 mg QE/100 g). The total phenolic content in the methanolic extracts of all the 6 medicinal plants were systematically assessed and the results were expressed in gallic acid equivalents (Fig. 2). Total phenolic content showed marked difference among the plants studied; *P. amarus* (46.92 mg GAE/g) had maximum phenolic content and *Cissus quadrangularis* (8.18 mg GAE/g) had least phenolic content. *P. amarus* was followed by *C. aromaticus* (42.82 mg GAE/g), *L. aspera* (29.41 mg GAE/g) and *A. paniculata* (17.11 mg GAE/g).

The results revealed that *P. amarus* showed significant flavonoid and phenolic content, which is correlated with the earlier reports.¹¹ In this study, the phenolic compounds were assessed by Folin–Ciocalteu reagent that does not give the complete picture of phenolics, however this assay will help to categorize the extracts based on their antioxidant potential.⁸ The phenolic content of the medicinal plants vary considerably which may be due to the high solar radiation and temperature.¹²

3.2. Determination of radical scavenging activity

The primary characterization of scavenging ability of the plant extracts has been studied using a stable free radical DPPH. The results of radical scavenging activity of all the medicinal plants are shown in Fig. 3. Among the plants

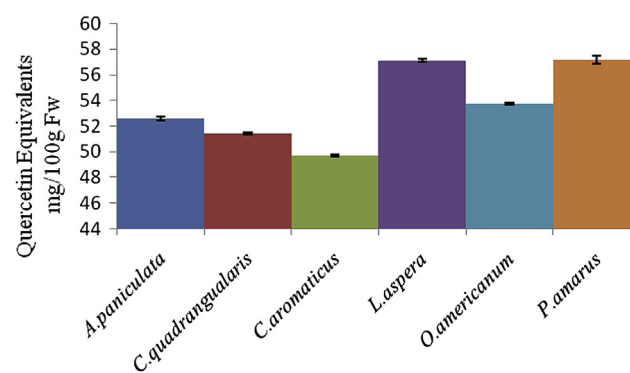


Fig. 1 – Total flavonoid content in 6 different medicinal plant extracts.

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