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Research Article

TOTAL PHENOLICS AND FLAVONOIDS IN SELECTED MEDICINAL PLANTS FROM KERALA

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ABSTRACT

Objective: The objective of the present study was to determine the total content of phenolics and flavonoids in selected medicinal plants such as *Atuna indica, Baliospermum montanum, Chukrasia tabularis, Humboldtia brunonis var. rakthapushpa and Soymida febrifuga*.

Methods: The total phenolic content (TPC) was estimated spectrophotometrically using Folin Ciocalteu method. Total flavonoid content (TFC) was measured by aluminium chloride colorimetric assay.

Results: The results showed that *Chukrasia tabularis* (belonging to the family Meliaceae) is the richest source of phenolics and flavonoid (total Phenolic content: 17.2 mg GAE/g and total flavonoid content: 3.82 QE/g). The lowest phenolic content was noticed in *Baliospermum montanum* (2.72 mg GAE/g) and lowest flavonoid content was observed in *Humboldtia brunoniss* var. raktapushpa (0.98 mg QE/g).

Conclusion: A significant linear correlation was observed between the values for the total phenolic content and antioxidant activity. The high contents of phenolic compounds indicated that these compounds contribute to the antioxidant activity. The *Chukrasia tabularis* can be regarded as promising plant species for natural plant sources of antioxidants with high potential value for drug preparation.

INTRODUCTION

There are about eight thousand naturally occurring plant phenolics and about half this number are flavonoids [1]. Phenolics possess a wide spectrum of biochemical activities such as antioxidant, antimutagenic, anti carcinogenic as well as ability to modify the gene expression [2]. Phenolics are the largest group of phytochemicals that account for most of the antioxidant activity in plants or plant products [3].

Flavonoids are the largest group of naturally occurring phenolic compounds, which occurs in different plant parts both in free state and as glycosides. They are found to have many biological activities including antimicrobial, mitochondrial adhesion inhibition, antiulcer, antiarthritic, antiangiogenic, anticancer, protein kinase inhibition etc [4]. The flavones and flavonols are the most widely distributed of all the Phenolics [5]. Flavonoids are particularly beneficial, acting as anti oxidants and giving protection against cardiovascular disease, certain forms of cancer and age related degeneration of cell components. Their polyphenolic nature enables them to scavenge injurious free radicals such as super oxide and hydroxyl radicals [6]. A variety of dietary plant flavonoids inhibits tumor development in experimental animal models [7]. The bi-flavonoids have the pharmacological effects like their ability to inhibit the release of histamines, the adhesion of blood platelets and the action of lens aldose reductase, to block the inflammatory effects of hepatotoxins, and to act as a heart stimulant [8].

Based on the strong evidence of biological activities of phenolic compounds, the study was focused on determination of total phenolics and flavonoids in selected medicinal plants of various species. In the present study five important medicinal plants viz *Atuna indica, Baliospermum montanum, Chukrasia tabularis, Humboldtia brunonis var. rakthapushpa and Soymida febrifuga* were screened for their total phenolics and flavonoid contents.

MATERIALS AND METHODS

Plant Material

Plants were collected from Kakkayam forest, Calicut, Kerala and the materials were authenticated from Botanical Survey of India, Southern Circle, Coimbatore. The voucher specimens are deposited at MH herbarium, Coimbatore.

Extraction

5 g each of the shade dried plant materials were pulverized into coarse powder and subjected to hydro alcoholic extraction using soxhlet apparatus. The extracts were concentrated to dryness in a rotary evaporator under reduced pressure. The dried residues were then dissolved in 100 ml of 80% methanol. The extracts were used for total phenolic and flavonoid assay.

Total Phenolic assay

The total phenolic content were determined by using the Folin-Ciocalteu assay [9]. An aliquot (1 ml) of extracts or standard solution of Gallic acid (100, 200, 300, 400, and 500µg/ml) was added to 25 ml of volumetric flask, containing 9 ml of distilled water. A reagent blank using distilled water was prepared. 1 ml of Folin-Ciocalteu phenol reagent was added to the mixture and shaken. After 5 minutes 10 ml of 7% Na_2CO_3 solution was added to the mixture. The volume was then made up to the mark. After incubation for 90 minutes at room temperature, the absorbance against the reagent blank was determined at 550 nm with an UV-Visible spectrophotometer. Total phenolics content was expressed as mg Gallic acid Equivalents (GAE)

Total Flavonoid Assay

Total flavonoid content was measured by the aluminium chloride colorimetric assay [10]. An aliquot (1ml) of extracts or standard solutions of quercetin (20, 40, 60, 80 and 100µg/ml) was added to 10 ml volumetric flask containing 4 ml of distilled water. To the flask was added 0.30 ml 5% $NaNO_2$, after five minutes 0.3 ml 10 % $AlCl_3$ was added. After five minutes, 2 ml IM NaOH was added and the volume was made up to 10 ml with distilled water. The solution was mixed and absorbance was measured against the blank at 510 nm. The total flavonoid content was expressed as mg quercetin equivalents (QE)

RESULTS AND DISCUSSION

The results for total phenolic and total flavonoid content in the studied plant extracts are presented in the graph.

The results showed that *Chukrasia tabularis* belonging to the family Meliaceae is the richest source of phenolics and flavonoid (total phenolic content: 17.2 mg GAE/g and total flavonoid content: 3.82 QE/g). The lowest phenolic content was noticed in *Baliospermum montanum* (2.72 mg GAE/g) and lowest flavonoid content was observed in *Humboldtia brunoniss* var. raktapushpa (0.98 mg QE/g).

There is a positive correlation between phenolic content and free radical scavenging activity [11-18]. The high phenolic content of *Chukrasia tabularis (*17.2 mg GAE/g) shows the linear correlation

between phenolic content and antioxidant activity. The general assessment of the analytical results for the plant extracts definitely shows the individual specificity of each sample and a rich diverse spectrum of phenolic compounds differing from flavonoid group.

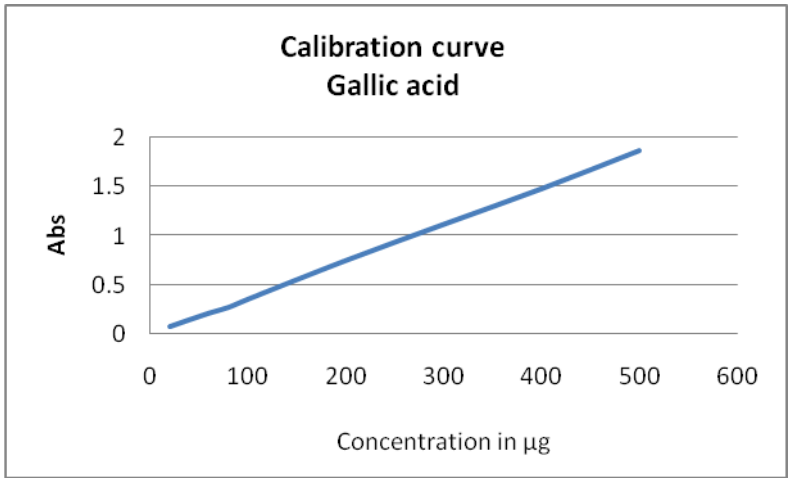

Fig 1.1: Calibration curve (Gallic acid)

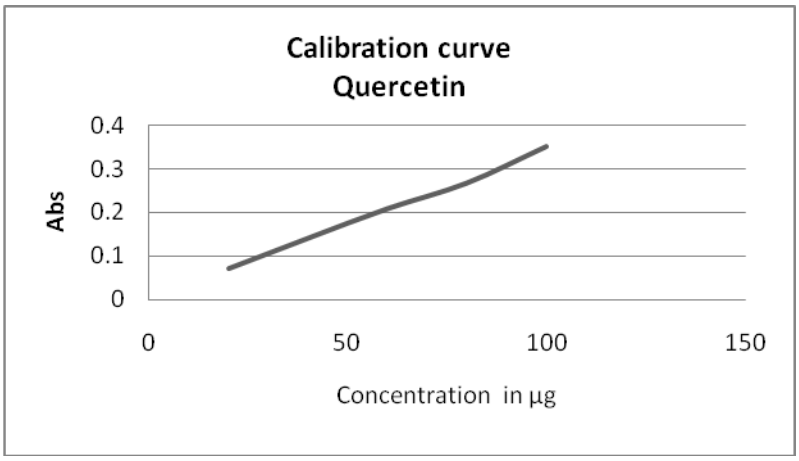

Fig 1.2: Calibration curve (Quercetin)

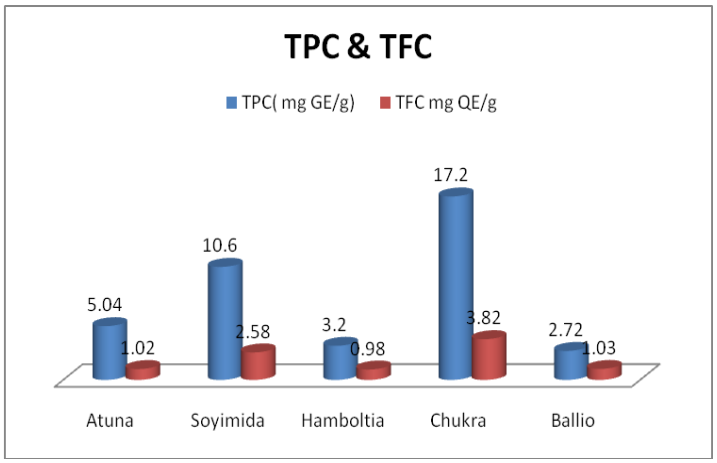

Fig 1.3: Total phenolic and total flavonoid content of the selected plants

CONCLUSION

The present study revealed the phenolic and flavonoid spectrum of medicinally important plants. The high contents of phenolic compounds indicated that these compounds contribute to the antioxidant activity. The *Chukrasia tabularis* can be regarded as promising plant species for natural plant sources of antioxidants with high potential value for drug preparation.

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