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Research Article

EVALUATION OF PHENOL AND FLAVONOID CONTENT FROM AERIAL PARTS OF *TECOMA STANS*

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ABSTRACT

Tecoma stans, from the family Bignoniaceae is an important medicinal plant. All parts are widely used in Ayurvedic system of medicines since ancient times. The present study was designed to investigate the content of phenols and flavonoids of various extracts of aerial parts of *T. stans*. All extracts revealed presence of phenol and flavonoid. The content of phenols and flavonoids of the investigated extracts differed as per the polarity of the solvents used. The content of total phenolics in the extract was determined spectrometrically according to the Folin-Ciocalteu procedure and calculated as catechol equivalent. The content of total flavonoids in the extract was determined and calculated as quercetin equivalent. Total phenolic compounds in ethanol extract is found to be 60.238 mg/g of extract calculated as Folin Ciocalteau equivalent (r^2= 0.991). Total flavonoids in ethanol extract is found to be 6.545 mg/g calculated as quercetin equivalent (r^2= 0.997). The greater amount of phenolic and flavonoid compounds are observed in ethanol extract than that of methanol and acetone extract.

Keywords: *Tecoma stans,* Bignoniaceae, Phenol, Flavonoid

INTRODUCTION

Plants are able to synthesize a multitude of organic molecules / phytochemicals, referred to as "secondary metabolites" [1, 2]. These molecules play variety of role in the life span of plants, ranging from structural ones to protection. Phenolic compounds are regarded as one such group that is synthesized by plants during development [1, 3] and in response to conditions such as infection, wounding ,UV radiation [4, 5] etc. Approximately 8000 naturally occurring compounds belong to the category of "phenolics". Phenols are associated with diverse functions, including nutrient uptake, protein synthesis, enzyme activity, photosynthesis; structural components and allelopathy [6- 8].Phenolics show an array of health promoting benefits in human health. They are of current interest due to their important biological and pharmacological properties, especially the anti-inflammatory [9], antioxidant [10], antimutagenic and anticarcinogenic activities [11- 12].They are widespread in plant based foods and human consume it. The estimated range of consumption is 25mg to 1g per day, depending on diet [13].

Flavonoids are universal within the plant kingdom. They functions as stress protectants in plant calls by scavenging reactive oxygen species produced by the photosynthetic electron transport system[14]. Due to UV-absorbing properties, flavonoids protect plants from the UV radiation of the sun and scavenge UV-generated reactive oxygen species[15.] Flavonoids are considered as important components in the human diet, although they are generally considered as non-nutrients.Flavonoid intake can range between 50 and 800 mg per day, depending on the diet consumption.

Tecoma stans, belonging to family Bignoniaceae, is a semi evergreen ornamental shrub or tree. It is distributed throughout India and South Africa. This shrub is found in other tropical and subtropical areas all over the World [16- 18]. All parts of *T. stans* are of medicinal importance and used traditionally for the treatment of various ailments. Traditionally, this plant is used by South American and Latin American people for reducing blood glucose [17].Bark shows smooth muscle relaxant, mild cardio tonic and chloretic activity. Applications include the experimental treatment of diabetes, digestive problems, control of yeast infections and other medicinal applications. The root of the plant is reported to be a powerful diuretic, vermifuge and tonic. A decoction of roots with lemon juice is used in small quantities as a remedy for snake and rat bites and also externally applicable [17-19]. The leaves are given in diabetes [20].

Owing to these properties, the present study was undertaken to evaluate phenolic and flavonoid content of aerial part of the *T. stans.*

MATERIAL AND METHODS

Phytochemical evaluation

Plant material

The aerial parts of *T. stans* were collected from Pune; Maharashtra, India during the month of September. The taxonomic identification is accomplished with the help of flora of Bombay Presidency [21] and Flora of Maharashtra[22] for identification. It was identified and authenticated at Botanical Survey of India, Pune, Maharashtra, India. Its voucher number is BSI / WRC / Tech / 2010 /372.

Extraction procedure

Air shade dried and pulverized aerial part (0.300 g) of *T. stans* was extracted with different solvents (20 ml) of increasing polarity from semi-polar (Acetone) to polar (methanol and ethanol). Material was ground, centrifuge for 20 minutes at room temperature in each solvent and filtered. The extract was evaporated to dryness in vaccum using a rotary evaporator. This extract was used to investigate the total content of phenols and flavonoids.

Estimation of total phenolic content [23]

The total phenolic contents of leaves and stem material were determined according to the method developed by Malik and Singh [23]. The Folin Ciocalteau reagent and sodium carbonate were added in alkaline solution of test sample. A blue coloured complex was developed due to phosphomolybdic acid, which is present in Folin-Ciocalteu reagent. Calibration plot was expressed as pyrrocatechol (2 -10 µg/ml) equivalent of phenol per gram of sample. Experiments were performed in triplicates and results were recorded as mean ± SEM (Standard Error Mean).

Estimation of total flavonoid content [24]

Aluminum chloride colorimetric method was used for flavonoids determination.

Each extract of the plant material (0.5 ml of 1:10 g ml^{-1}) in methanol was separately mixed with 1.5 ml of methanol, 0.1 ml of 10% aluminum chloride, 0.1 ml of 1 M potassium acetate and 2.8 ml of distilled water. It was kept at room temperature for 30 minutes. The absorbance of the reaction mixture was measured at 415 nm with a double beam using UV -VIsS1700 Pharma spectrophotometer Schimadzu. The calibration plot was generated by using quercetin solutions at concentrations 12.5 to 100 µg/ml in methanol. Experiments were performed in triplicates and results were recorded as mean ± SEM (Standard Error Mean).

RESULTS AND DISCUSSION

The extractive values of the various extracts are shown (Table 1).

Table 1: Extractive values of the various extracts

Solvent	Extractive values
Acetone	2.76 ± 0 86
Ethanol	7.66 ± 1.03
Methanol	7.43 ± 1.13

The highest yield of the extract (7.66 g/100 g) of dry plant material was obtained by extraction with ethanol. The yield of ethanol extract was higher than yield of acetone and methanol extract by 4.9 and 0.23% respectively.

Plant extracts with high phenolic content also enclosed high flavonoid content [25].The amount of total phenolic and flavonoids for the test samples are summarized (Table 2 and 3).

Table 2: Total Phenol Content of Different Extracts

Extract	Acetone	Ethanol	Methanol
Total Phenolic Content mg/g ± SEM	52.44 ± 1.01	60.23 ± 1.95	50.24 ± 4.11

Each value represents mean± SEM (n=3)

Table 3: Total Flavonoid Content of Different Extracts

Extract	Acetone	Ethanol	Methanol
Total Flavonoid Content mg/g ± SEM	4.57± 0.16	6.54± 0.0009	5.12 ± 0.76

Each value represents mean± SEM (n=3)

CONCLUSION

This study indicates that all extracts showed presence of high amount of phenolic and flavonoid compounds from the aerial parts of the medicinally important plant- *T. stans*.

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