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Research Article

SPECTROSCOPIC DETERMINATION OF TOTAL PHENOLIC AND FLAVONOID CONTENTS OF *AGLAIA LAWII* LEAVES

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ABSTRACT

Objective: Aim of our study is spectroscopic determination of total phenol and flavonoid contents of *Aglaia lawii.*

Methods: Aglaia lawii leaves were collected, powdered and extracted with ethyl acetate, acetone, ethanol and methanol separately. The present study was designed to investigate the content of phenols and flavonoids of various extracts of aerial parts of *A.lawii*.

Results: All extracts revealed presence of phenol and flavonoid. The content of phenols and flavonoids of the investigated plant parts are differed. The content of total phenolics in the extracts were determined. The leaves contain the maximum and the bark contains the minimum amount of phenols. The flavonoid content of the fruit was quite high compared to that of the leaves, stem, bark and the seed.

Conclusion: The present investigation revealed that the leaves stem, bark seed and fruit of *A.lawii* contain significant amount of phenols and flavonoids. The objective of this study was to get information of the amount of phenolics and flavonoids in different parts of *A.lawii*. Further intention of this study is to correlate relationship of these secondary metabolites to possible biological activities and evaluate *A.lawii* as a potential source of natural bioactive chemicals.

Keywords: *Aglaia lawii,* Meliaceae, Phenol, Flavonoid, Folin-Ciocalteau reagent, Catechol, Quercetin.

The Indian region is well known for its na
than 80% of the developing world continues to rely on traditional medicines predominantly plants, for its primary health care [1]. Phenolics are one of the main secondary metabolites present in the plant kingdom. They are commonly found in both edible and non-edible plants, and have been reported to have multiple biological effects, including antioxidant activity [2].They are essential for the growth and reproduction of plants, and are produced as a response for defending injured plant against pathogens. Flavonoids, the most common group of polyphenolic compounds that are found ubiquitously in plants. These are widely distributed in plant fulfilling many functions. Flavonoids and other plant phenolics are especially common in leaves, flowering tissues and woody parts such as stem and bark [2]. They are important in plant for normal growth development and defense against infection and injuries [2]. These secondary metabolites also show anti-allergic, anti-inflammatory, anti-microbial and anticancer activity [3].Researchers have become interested in flavonoids and other phenolics for their medicinal properties, especially their potential role in the prevention of cancer and heart diseases [1]. Over 5000 naturally occurring flavonoids have been characterized from various plants [4].

A.lawii is distributed from India, through Burma (Myanmar), Thailand, Indo-China and throughout Malaysia towards the Solomon Islands [5-7]. *A. Lawii* is a traditional medicinal plant having been used for the treatment of bacterial infection, liver, tumour diseases and headaches [8]. The present study deals with the leaves *of A. lawii*, is a traditional medicinal plant used in Ayurveda for therapeutic purposes. All parts of the plants are reported to be medicinally important for the treatment of various diseases in Ayurveda [9]. The pharmacological studies have shown that Aglaia species possess various notable biological activities such as anthelmintic, antimicrobial, analgesic, anti-inflammatory, immunimodulatory, antifungal etc [10]. Currently available synthetic antioxidants like butylated hydroxyl toluene (BHT),butylated hydroxyl anisole (BHA), tertiary butylated hydroquinone and gallic acid esters have been suspected to cause or prompt negative health effects [11]. Hence there is need to substitute them with naturally

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phenolic contents from the leaves, stem, bark, seed and fruit of *A.lawii* by spectrophotometric method. This type of work is done for the first time.

MATERIALS AND METHODS

Sample collection and Identification of plant materials

The plant material was collected from Mulshi district of Pune, Maharashtra, India. It was authenticated at Botanical survey of India, Pune, Maharashtra, India. Its Authentication No. is BSI/WRC/Tech/2010/1028, Pune, India. All the plant materials were air shade dried and pulverized which is used for experiments. Folin-ciocalteau reagent and all other chemicals used were Merck products. UV-Vis S1700 Pharma spectrophotometer, Schimadzu was used for absorbance measurements. Accurately weighed powder of sample was ground with a pestle and mortar in the measured volume of solvents (80: 20 ethanol -water). Each extract was filtered through Whatman (No 1) filter paper. Each extract was prepared freshly for the analysis to prevent any degradation.

Total Phenol determination [12]

Phenols the aromatic compounds with hydroxyl groups react with phosphomolybdic acid in Folin-Ciocalteu reagent in alkaline medium and produce blue coloured complex. Calibration curve was prepared by using catechol solutions at concentrations 2 to10 µg/ml in distilled water.

Total flavonoid determination [13]

Aluminum chloride colorimetric method was used for flavonoids determination (Chang et al., 2002). Each plant extracts (0.5 ml of1:10 g ml-1) in methanol were 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 min. The absorbance of the reaction mixture was measured at 415 nm with a double beam using UV -VIsS1700 Pharma spectrophotometer Schimadzu. The calibration curve was prepared by using quercetin solutions at concentrations 12.5 to 100 µg/ml in methanol.

RESULTS AND DISCUSSION

Figure-1 and **Figure-2** present the calibration plot for the determination of phenols and flavonoids, respectively. **Table-1** summarizes the phenol and flavonoid contents of leaves, stem, bark, fruit and seed of *A. lawii.* **Figure- 3** presents total Phenolic and Flavonoid content of parts of *A.lawii.*

Flavonoids are a group of polyphenolic compounds with known properties which include free radical scavenging, inhibition of hydrolytic oxidative enzymes and anti-inflammatory action. Some evidence suggests that the biological actions of these compounds are related to their antioxidant activity (Gryglewski et al., 1987). Preliminary phytochemical analysis of the plant

revealed the presence of phenolic compounds, terpenoids, tannins, alkaloids, flavonoids and steroids It has been recognized that flavonoids show antioxidant activity and their effects on human nutrition and health are considerable. The mechanisms of action of flavonoids are through scavenging or chelating process[6].Phenolic compounds are a class of antioxidant agents which act as free radical terminators. Results in present study show total phenol content as catechol equivalent standard curve equation (y=0.0966x, R^2=0.9878) and flavonoid content as qurcetin equivalent standard curve equation (y=0.0148x, R^2=0.975) All values in the following table are obtained by the average of three experiments ± standard deviation. The present study revealed the phenol contents of the leaves, stem, fruit, seed and flower of *A.lawii* in terms of mg catechol equivalent/g of dry sample (standard plot: y=0.0966x, R^2=0.9878). The values were found between 41 to 61.89 mg catechol equivalent/g. The leaves contain the maximum and the bark contains the minimum amount of phenolic compounds. Antioxidant activity of extracts of different parts of the plant exhibited the following order leaf>seed>fruit>stem> bark measured using Folin Ciocalteu Phenol reagent in terms of catechol. Phenolics present in the leaves, stem, fruit, seed and bark have received considerable attention because of their potential biological activities. Flavonoids as one of the most diverse and widespread group of natural compounds are probably the most important natural phenols. These compounds possess a broad spectrum of chemical and biological activities including radical scavenging properties. Using the standard plot of quercetin (y = 0.0148x, R^2 =0.975), the flavonoid contents of *A.lawii* seed, leaves, bark, stem and fruit were found ranging from 25 to 73.47 mg quercetin equivalent/g of dry sample. The flavonoid content of the fruit was quite high compared to that of the seed, leaves bark and the stem. Total flavonoid content in plant part exhibit different extent as fruit>stem>bark>leaves>seed. Plant extracts with high phenolic content also enclosed high flavonoid content [14].

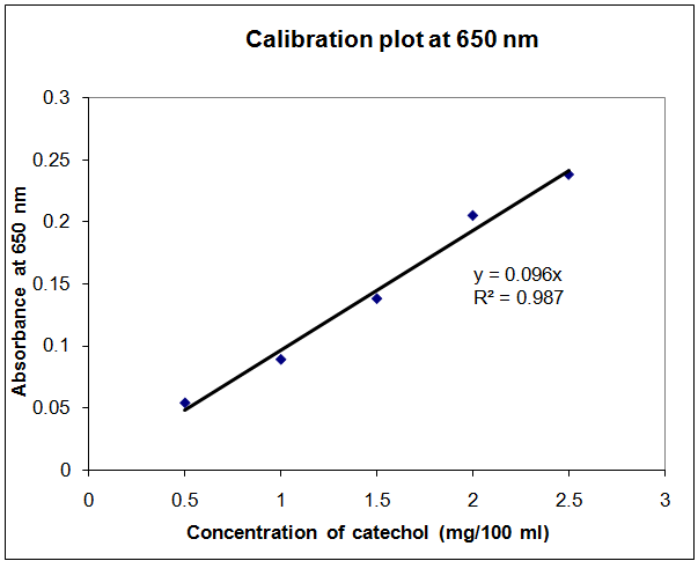

Fig. 1: Calibration plot for phenolic determination

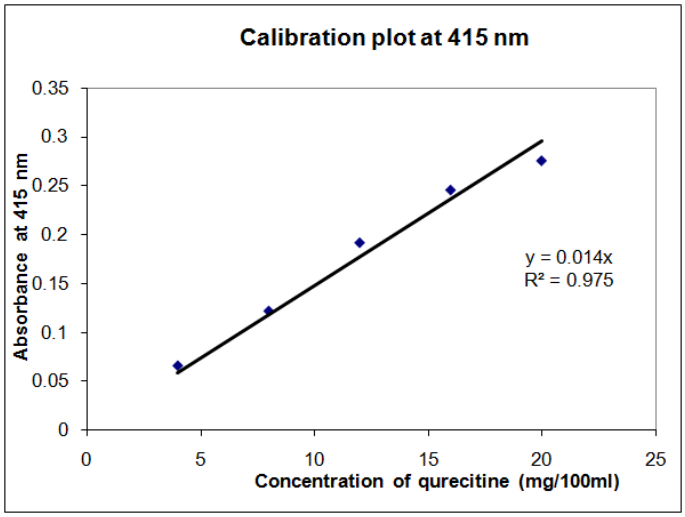

Fig. 2: Calibration plot for flavonoid determination

Table 1: It shows total Phenolic and Flavonoid content of different plant parts extracts.

Plant parts	Phenol (mg/g)	Flavonoid (mg/g)
Leaves	61.89	50.67
Seed	60.10	25
Fruit	44.48	73.47
Stem	42.78	62.5
Bark	41	62

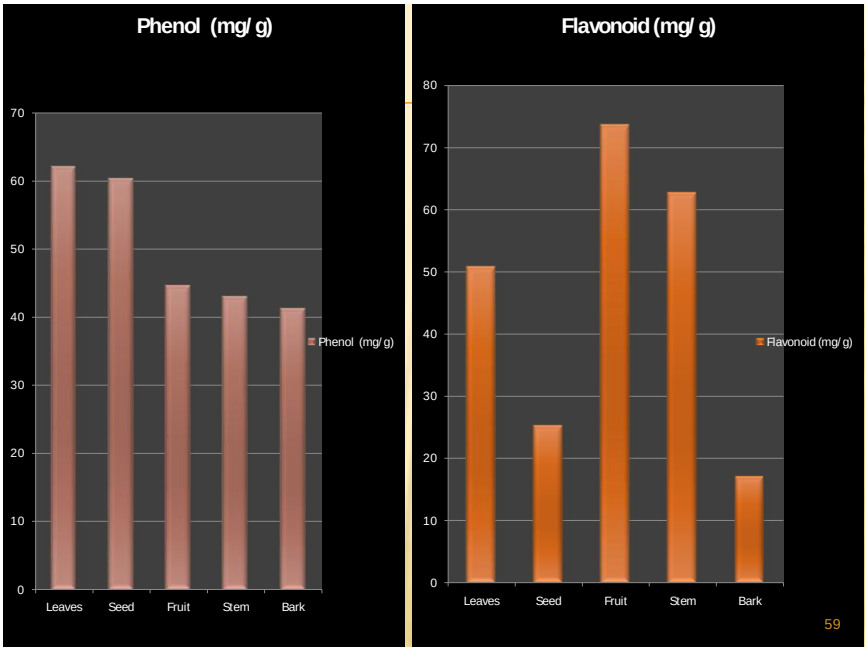

Fig. 3: Total Phenolic and Flavonoid content of parts of *A.lawii.*

CONCLUSION

The present investigation revealed that the leaves stem, bark seed and fruit of *A.lawii* contain significant amount of phenols and flavonoids. The objective of this study was to get information of the amount of phenolics and flavonoids in different parts of *A.lawii*. Further intention of this study is to correlate relationship of these secondary metabolites to possible biological activities and evaluate *A.lawii* as a potential source of natural bioactive chemicals.

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