IJPSR (2017), Volume 8, Issue 12 **(Research Article)**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 03 April, 2017; received in revised form, 11 August, 2017; accepted, 17 September, 2017; published 01 December, 2017

DETERMINATION OF TOTAL FLAVONOID AND PHENOL CONTENT IN *MIMUSOPS ELENGI* LINN.

Ruchi Mathur and Rekha Vijayvergia*

Plant Pathology and Biochemistry Laboratory, Department of Botany, University of Rajasthan, Jaipur - 302004, Rajasthan, India.

Keywords:

Mimusops elengi Linn., Phytochemicals, Phenols, Flavonoids

Correspondence to Author:
Dr. Rekha Vijayvergia

Associate Professor,
Plant Pathology and Biochemistry Laboratory, Department of Botany, University of Rajasthan, Jaipur-302004, Rajasthan, India.

E-mail: rekhavijay1367@gmail.com

ABSTRACT: Objective: To study qualitative and quantitative estimation of phytochemicals and determination of total phenol and flavonoid content in plant parts of *Mimusops elengi* Linn. **Methods:** The solvents methanol, ethanol, aqueous and petroleum ether are used for extraction of *Mimusops elengi* Linn. plant parts. Phytochemical screening of plant parts was carried out in all the solvents. Quantitative estimation of carbohydrate, protein and lipids was done according to the established protocol. Determination of total phenol content was carried out using Folin - Ciocalteau method and total flavonoid content using Aluminium chloride colorimetric method. **Results:** The result revealed the presence of carbohydrates, alkaloids, flavonoids, tannin, saponin and terpenoids *etc*. Total phenol content was expressed in mg of Gallic Acid Equivalent (GAE) per g of dry weight. In results it was found that petroleum ether extract shows highest phenol content 267.20 mg/g in fruits. The content of flavonoids was expressed in mg of Quercetin Equivalent (QE) per g of dry weight. It was evaluated that total flavonoid content found highest in bark 113.35 mg/g in petroleum ether extract. **Conclusion:** These results suggest that *Mimusops elengi* Linn. plant is medicinally and commercially important.

INTRODUCTION: Herbal plant medicines are major remedy in traditional system and now can be used due to side effects of antibiotics and other drugs. Today, antibiotics are becoming a problem because their toxic effect on human body. The bark, stem and fruits of medicinal plant are used in various Ayurvedic and folk medicine to treat various ailments. Primary metabolites are compounds synthesized by plants for both essential and specific functions, such as growth and development [1]. Primarily phenolic compounds are of great importance as cellular support material and form the integral part of polymeric phenolics [2].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.8(12).5282-85

Article can be accessed online on: www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.8(12).5282-85

Phenolic compounds (flavonoids and phenolic acids) are antioxidant agents which act as free radical terminators and their bioactivities may be related to their abilities to chelate metals, inhibit lipoxygenase and scavenge free radicals [3].

Bioactive polyphenols have attracted special attention because they can protect the human body from the oxidative stress which may cause many diseases, including cancer, cardiovascular problems and ageing [4]. *Mimusops elengi* Linn. (family Sapotaceae) commonly known as Bakul is native to the Western Ghat region of the peninsular India. The stem is used as teeth cleaner and bark is used to cure bleeding of gums. Fruit are used to protect loose teeth [5] and to cure chronic dysentery. The various extract of plant (bark, fruit, leaves, seeds and flowers) have been reported to be cardiotonic, alexipharmic and stomachic, hypotensive, antibacterial, antihelmintic, anti-gastric ulcers, teeth cleaner and renewable sources of energy [6].

MATERIAL AND METHODS:

Plant Material: Plant parts (Bark, Stem, Fruits) of *Mimusops elengi* Linn. were collected from district Jaipur, Rajasthan. It was authenticated as (RUBL 211587) by Herbarium, Department of Botany, University of Rajasthan, Jaipur, Rajasthan, India.

Extraction: Dry powder of plant parts was percolated in a soxhlet apparatus with solvents (methanol, ethanol, distilled water and petroleum ether) [7].

Phytochemical Screening: Phytochemical screening of active plant extracts was done by following the standard [8, 9] methods. Various phytochemicals such as carbohydrates, proteins, alkaloids, flavonoids, triterpenoids, saponin and tannins were tested.

Quantification of Primary Metabolites: Stem, bark and fruits of *Mimusops elengi* Linn. were evaluated quantitatively to estimate the total levels of soluble sugars, starch, proteins, lipids, following the established methods for the sugars, starch, protein, lipid [10, 11, 12]. All experiments were repeated in triplicate and data were calculated as mean ±S.E.M.

Total Phenol Content Determination: The total phenol content was determined with the Folin-Ciocalteu's assay [13] using gallic acid as standard. In the procedure, 0.5 ml of plant extracts were mixed with 1.5 ml Folin- Ciocalteu's reagent (FCR) diluted 1:10 v/v than after 5 minutes 1.5 ml of 7% sodium carbonate solution was added. The final volume of the tubes was make upto 10 ml with distilled water and allowed to stand for 90 minutes at room temperature. Absorbance of sample was measured against the blank at 750 nm using a spectrophotometer. All the experiment was repeated three times for precision and values were expressed in mean + standard deviation in terms of phenol content (Gallic acid equivalent, GAE) per g of dry weight.

Total Flavonoid Content Determination: Total flavonoid content was determined by Aluminium chloride method [14] using quercetin as a standard. 1ml of test sample and 4 ml of water was added to a volumetric flask (10 ml volume). Add 0.3 ml of 5 % Sodium nitrite, 0.3 ml of 10% Aluminium chloride was added after 5 minutes. After 6 minutes incubation at room temperature, 1ml of 1 M Sodium hydroxide was added to the reaction mixture. Immediately the final volume was make upto 10 ml with distilled water. Absorbance of sample was measured against the blank at 510 nm using a spectrophotometer. All the experiment was repeated three times for precision and values were expressed in mean ± standard deviation in terms flavonoid content (Quercetin equivalent, QE) per g of dry weight.

RESULTS:

TABLE 1: PHYTOCHEMICAL ANALYSIS OF *MIMUSOPS ELENGI* LINN.

	Phytochemical Screening											
	Methanol			Ethanol			Aqueous			Petroleum ether		
	Bark	Stem	Fruit	Bark	Stem	Fruit	Bark	Stem	Fruit	Bark	Stem	Fruit
Extractive value (mg/g)%	11.2	10.2	18.6	13.9	9.5	20.1	8.0	7.7	16	2.8	1.4	3.2
Carbohydrate (Fehling's Test)	+	+	+	+	+	+	+	+	-	-	-	-
Protein (Xanthoproteic)	-	-	-	-	+	-	-	-	-	-	+	+
Alkaloids (Dragendorff's)	-	+	+	+	+	+	-	-	-	-	-	-
Flavonoids (Shinoda Test)	+	+	+	+	+	-	+	+	+	+	-	+
Tannin (Neutral $FeCl_3$)	+	+	+	+	+	-	-	-	-	+	+	+
Saponin (Foam Test)	+	-	+	+	+	+	+	-	+	-	-	-
Triterpenoids (Noller's Test)	+	+	-	+	+	-	-	-	-	+	+	+

+ shows presence of compound; - shows absence of compound

Quantification of Primary Metabolites:

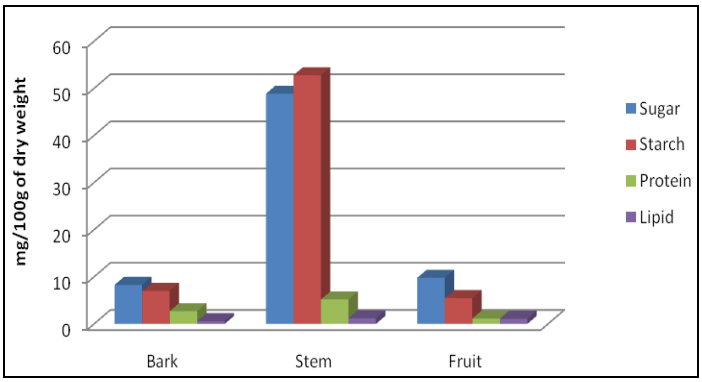

FIG. 1: GRAPHICAL REPRESENTATION OF EFFECT OF *MIMUSOPS ELENGI* LINN.

TABLE 2: TOTAL PHENOL CONTENT IN DIFFERENT SOLVENTS OF PLANT PARTS OF *MIMUSOPS ELENGI* LINN.

Plant parts	Total Phenol content (mg of Gallic acid equivalent/g of dry weight)			
	Methanol	Ethanol	Aqueous	Petroleum ether
Bark	154.36±0.51	58.14±0.14	72.60±1.10	94.16±1.02
Stem	51.22±0.95	60.39±0.56	51.48±0.96	114.83±0.88
Fruit	86.45±0.05	118.44±0.02	55.90±0.33	267.20±0.64

Mean ± Standard Deviation

TABLE 3: TOTAL FLAVONOID CONTENT IN DIFFERENT SOLVENTS OF PLANT PARTS OF *MIMUSOPS ELENGI* LINN.

Plant parts	Total Flavonoid content (mg of Quercetin equivalent/g of dry weight)			
	Methanol	Ethanol	Aqueous	Petroleum ether
Bark	54.7±0.22	58.14±0.36	23.55±0.80	113.35±0.52
Stem	50.77±0.45	41.83±0.06	52.81±0.02	53.02±0.02
Fruit	11.36±0.59	9.02±0.20	3.63±0.07	31.37±0.34

Mean ± Standard Deviation

Statistical Analysis: All experimental results were carried out in triplicate and were expressed as average of three analyses ± SD (Standard Deviation).

CONCLUSION AND DISCUSSION: In phytochemical screening the bioactive compounds normally present in plant parts can be identified. According to **Table 1** results methanol, ethanol revealed the presence of carbohydrate, alkaloids, flavonoids, tannin, saponin and triterpenoids in different plant parts of *Mimusops elengi* Linn. while petroleum ether revealed the presence of protein, flavonoids, tannin and triterpenoids. Maximum yield was found in ethanol extract of fruit (20.1%). Carbohydrate (sugar and starch) and protein is present in all three parts extracts and lipid is present in very less amount. Primary metabolites were found highest in stem. The screening of plant part revealed that the amount of total phenol contents were higher in petroleum ether extract of fruit 267.20±0.64 mg GAE/g, while lower amount in methanol extract of stem 51.22±0.95 mg GAE/g **Table 2**.

Flavonoids were reported in plant parts of *Mimusops elengi* Linn. Total flavonoid content was found higher in petroleum ether extract > ethanol > methanol > aqueous extract. The flavonoid content was higher in petroleum ether extract of bark and lower in aqueous extract of fruits **Table 3**. The screening of bark, stem and fruit indicates the presence of high phenolic content which may be due to presence of phenol, flavonoid and tannin which possess antioxidant activity.[15]

ACKNOWLEDGEMENT: Author Ph.D Scholar Ruchi Mathur is grateful to Department of Botany, University of Rajasthan for providing me necessary facilities and UGC for financial support as student Non NET Fellowship.

CONFLICT OF INTEREST: Nil.

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How to cite this article:
Mathur R and Vijayvergia R: Determination of total flavonoid and phenol content in *Mimusops elengi* Linn. Int J Pharm Sci Res 2017; 8(12): 5282-85.doi: 10.13040/IJPSR.0975-8232.8(12).5282-85.