

# Comparison of Phytochemical And Biochemical Analysis In Leaves of *Justicia Gendarussa*, *Burm. F.* and *Justicia Adhatoda*, *L*

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**Abstract-** *Justicia gendarussa*, *Burm. f.* and *Justicia adhatoda*, *L.* are medicinal plants belonging to the family *Acanthaceae*. The various parts of *Justicia gendarussa* plant are found to be traditionally used to cure various diseases such as liver disorders, inflammation, tumors, and skin diseases. *Justicia adhatoda* also a highly valued Indian medicinal plant which is used in the treatment of respiratory diseases like asthma, cough, bronchitis and tuberculosis. In the present study, phytochemical and biochemical analysis have been carried out to analyse the presence of various secondary metabolites in the two test plants namely *Justicia gendarussa* and *Justicia adhatoda*. The study revealed the presence of almost all the phytochemicals tested except gum in both *Justicia gendarussa* and *Justicia adhatoda* and starch in *Justicia gendarussa*. *Justicia gendarussa* showed the presence of more amounts of carbohydrate and starch than *Justicia adhatoda*. Protein was present more amounts in *Justicia adhatoda*.

**Keywords-** *Justicia gendarussa*, *Justicia adhatoda*, Phytochemical analysis, Biochemical analysis

## I. INTRODUCTION

Plants have played a critical role in maintaining human health and civilizing the quality of human life for thousands of years. The use of plants as medicine is as old as human civilization itself and out of about 258650 species of higher plants reported from the world. More than 10% are used to cure aligning communities many of the existing medicinal system such as Ayurveda, Unani, Homeopathy, Naturopathy, Siddha and other alternative medicinal system have been utilizing plants as effective medicine to cure many harmful diseases.

Acanthaceae is known from a variety of very diverse tropical and subtropical habitats, and its four main centers of distribution are Indo-Malaysia, Africa, Brazil and Central America. Cable and Cheek (1998) placed the Acanthaceae as the sixth most abundant family in the Mount Cameroon

region. This group of plants is important to both man and animals being used as food and medicine. In Kenya, for example, some species provide fodder for grazing animals especially goats. Acanthaceae can be used as bio-indicators to understudy the spatial distribution of plant communities (Fongod *et al.*, 2013). *Justicia gendarussa*, *Burm. f.* belonging to family Acanthaceae, commonly known as Willow-leaved *Justicia*. It is found widely distributed throughout the river beds of Southern India. The various parts of this plant are found to be traditionally used to cure various diseases such as liver disorders, inflammation, tumors, and skin diseases. According to Indian and Chinese system of traditional medicine, the roots and leaves are joined to treat fever, respiratory disorders, hemiplegia, arthritis, muscle pain, rheumatism, headache, digestive tract problems, and in some cases of mental illness. From the literature review, the plant is reported to have the potential antioxidant, antimicrobial, anti-inflammatory, antinociceptive, antiarthritic, antifungal, antiangiogenic, analgesic, antianxiety, hepatoprotective, antibacterial, anticancer, antihelminthic, cytotoxic and antiviral activities.

*Justicia adhatoda* is commonly known as Vasaka or Malabar nut. It is a highly valued Indian medicinal plant which is used in the treatment of respiratory diseases like asthma, cough, bronchitis and tuberculosis. For instance, the source of the drug 'vasaka' is well known in the indigenous system of medicine for its beneficial health effects, particularly in treating bronchitis. The different parts of the plant is used in the Indian traditional medicine for the treatment of various diseases like asthma, joint pain, lumber pain and sprains, cough, eczema, malaria, rheumatism, swellings and venereal diseases. The main objective of the present study is to screen for the phytochemical and biochemical compounds present in the two test plants namely *Justicia gendarussa* and *Justicia adhatoda*.

## II. MATERIALS AND METHODS

### Collection of plant materials

Fresh leaves of *Justicia gendarussa* and *Justicia adhatoda* were obtained from Malappuram district of Kerala. Then the leaves were dried under shade, powdered and stored in air tight container for further analysis.

#### *Justicia gendarussa*, Burm. F. *Justicia adhatoda*, L.



#### Phytochemical analysis

The leaf powders of both the plants were dissolved in various solvents and the preliminary phytochemical tests were carried out using the standard method.

#### Biochemical analysis

Estimation of carbohydrate, starch and protein were carried out by using the standard methods.

### III. RESULTS AND DISCUSSION

#### Phytochemical analysis

In the present study using dry leaf powder, a preliminary phytochemical screening was carried out to identify the active constituents such as carbohydrate, protein, starch, amino acid, steroids, glycosides, flavonoids, alkaloids, tannin, saponin, terpenoids, gum and phenol present in the leaves of the two medicinal plants. The dried and powdered leaves of *Justicia gendarussa* and *Justicia adhatoda* were dissolved in different solvents viz., ethanol, chloroform, water, and the extracts thus obtained were analyzed for the presence or absence of secondary metabolites and represented in Table 1.

**Table 1: Phytochemical Screening of *Justicia gendarussa*, Burm. F. and *Justicia adhatoda*, L.**

Sl. No.	Phytochemical constituents	<i>Justicia gendarussa</i>			<i>Justicia adhatoda</i>		
		Ethanol	Chloroform	Water	Ethanol	Chloroform	Water
1.	Carbohydrate	+	+	+	+	+	+
2.	Protein	+	+	+	+	+	+
3.	Starch	-	-	-	-	-	-
4.	Amino acid	+	+	+	+	+	+
5.	Steroids	+	+	+	+	+	+
6.	Glycoside	+	+	+	+	-	+
7.	Flavonoids	-	+	+	-	+	+
8.	Alkaloids	-	-	+	+	+	-
9.	Tannin	-	+	+	-	+	+
10.	Saponin	+	+	+	+	+	-
11.	Terpenoids	+	+	+	+	+	+
12.	Gum	-	-	-	-	-	-
13.	Phenol	+	+	+	+	+	+

+= Present ; - = Absent

In *Justicia gendarussa*, carbohydrates, protein, amino acid, steroids, glycosides, saponins, terpenoids and phenols were observed in all the three solvent extracts. Carbohydrate, protein, amino acid, steroids, glycosides, saponin, terpenoids and phenols were observed in both ethanol and chloroform extracts. Starch and gum were completely absent in all three solvent extracts of leaves of *Justicia gendarussa*. Alkaloids were present only in water extract of *Justicia gendarussa*. Flavonoids and tannins were observed only in chloroform and water extracts.

The phytochemical screening of *Justicia gendarussa* on stem showed the presence of alkaloids, flavonoids, steroids, terpenoids, phenols, saponins, tannins and carbohydrates (Murugesan, 2017). The preliminary phytochemical analysis of *Justicia gendarussa* on stem and leaves revealed the presence of glycosides, tannins, phenols, terpenoids and flavonoids.

The phytochemical screening of leaf of *Phyllanthus amarus* revealed the presence of flavonoids, tannins, alkaloids, terpenoids, saponins and steroids (Obianime and Uche, 2008). The phytochemical screening of leaves of *Mallotus rhamniifolius* revealed the presence of alkaloids, carbohydrates, steroids, tannins, protein, amino acid, terpenoids, flavonoids, saponin and phenol (Loganathan *et al.*, 2017). Phytochemical screening of leaves of five medicinal plants i.e. *Phyllanthus amarus*, *Clerodendrum viscosum*, *Ailanthus exelsa*, *Syzigium cumini* and *Cassia occidentalis* using various solvent extracts revealed the presence of steroids, saponin, alkaloids, flavonoids, glycosides, phenols, tannin and terpenoids (Joseph *et al.*, 2013). The preliminary phytochemical analysis of *Psidium* leaves revealed the presence of alkaloids, saponins, carbohydrates, tannins and flavonoids (Vikrant Arya *et al.*, 2012). The phytochemical analysis of *Moringa concanensis* Nimmo showed the presence of alkaloids, flavonoids, terpenoids, phenols, saponins, carbohydrates, proteins and amino acids.

In *Justicia adhatoda*, among the three solvents used for extraction, ethanol, chloroform and water showed the presence of carbohydrate, protein, starch, amino acids, steroids, terpenoids and phenol. Except for water, carbohydrate, protein, starch, amino acid, steroids, alkaloids, saponins, terpenoids and phenol were observed. Gum was completely absent in all the three solvent extracts of leaves of *Justicia adhatoda*. Glycoside was present in two solvent extracts except chloroform. Flavonoids and tannin were present in two solvent extracts except ethanol. Among the three solvent extracts of leaves of *Justicia adhatoda*, saponins and alkaloids were observed in chloroform and ethanol.

Preliminary phytochemical evaluation of *Justicia adhatoda* revealed the presence of carbohydrates, alkaloids, flavonoids, saponins and steroids (Ramya Sri *et al.*, 2015). The phytochemical analysis showed the presence of alkaloids, flavonoids, steroids, terpenoids, phenols, starch, protein and carbohydrate in *Adhatoda vasica* (Gayathri and Bindhu, 2016).

A phytochemical test carried out by Okereke *et al.*, (2015) on the calyces of *Hibiscus sabdariffa* revealed the presence of various phyto constituents like glycosides, tannin, alkaloid, flavonoid, phenol and steroids. The preliminary phytochemical analysis of the leaf crude extracts of *Nerium oleander* L. showed the presence of phenol and steroids. Rajendrabhai Vasait and Kirankumar Khandare (2017) reported that, crude leaf extracts of *Simarouba glauca* contain carbohydrates, amino acid, steroids, tannins, terpenoids, phenols and saponins. The phytochemical analysis showed the presence of tannins, alkaloids, saponins, glycosides and flavonoids (Idayat Shade Ijaiya *et al.*, 2014). Phytochemical screening of leaves of six medicinal plants i.e. *Bryophyllum pinnatum*, *Ipomea aquatica*, *Oldenlandia corymbosa*, *Ricinus communis*, *Terminalia bellerica* and *Tinospora cordifolia* using various solvent extracts revealed the presence of protein, carbohydrates, phenols, tannins, flavonoids and saponins (Yadav and Munin Agarwala, 2011). The phytochemical analysis of *Catharanthus roseus* using methanol and water extracts revealed the presence of alkaloids, phenols, saponins and proteins in both extracts (Kabesh *et al.*, 2015). Prabhavathi *et al.*, (2016) reported that ethanol extracts of *Cissus quadrangularis* contain alkaloids, flavonoids, tannins, terpenoids, proteins, carbohydrates and phenols. Phytochemical analysis is very useful in the evaluation of some active biological components of some vegetables and medicinal plants (Oloyede, 2005). Plants have played a critical role in maintaining human health and civilizing the quality of human life for thousands of years. Medicinal plants have bio active compounds which are used for curing various human diseases. Thus, analyzing the

phytochemical constituents present in the plants is very important commercially and has great interest in pharmaceutical companies for the production of new drugs (Abdul Wadood *et al.*, 2013).

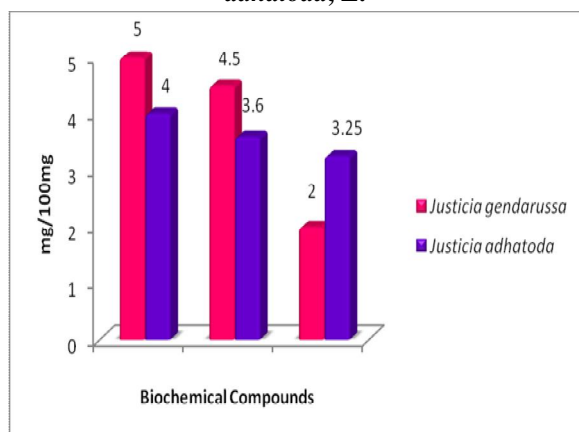
In comparative study between *Justicia gendarussa* and *Justicia adhatoda* showed the presence of carbohydrate, protein, amino acids, steroids, terpenoids, and phenols in all the three solvent extracts. Flavonoid was present in water and chloroform extracts of both plants. They were absent in ethanolic extracts. Among the three solvent extracts of the leaves of *Justicia gendarussa*, starch was absent. But it was present in three solvent extracts of *Justicia adhatoda*. Glycosides were present in all three extracts of the leaves of *Justicia gendarussa*. It was absent in chloroform extract of *Justicia adhatoda*. Flavonoids and tannins were absent in ethanolic extracts of both *Justicia gendarussa* and *Justicia adhatoda*. Alkaloids were absent in extracts of both ethanol and chloroform in *Justicia gendarussa*, whereas it was present in extracts of ethanol and chloroform of *Justicia adhatoda*. Alkaloids were present in water extracts of *Justicia gendarussa*, but it was absent in *Justicia adhatoda*. Tannins were absent in ethanolic extracts of both *Justicia gendarussa* and *Justicia adhatoda*. Tannin was present in the extracts of chloroform and water. In *Justicia gendarussa*, saponin was present in all three extracts of leaves. It was absent in water extracts of *Justicia adhatoda*. Gums were completely absent in all three extracts of both *Justicia gendarussa* and *Justicia adhatoda*.

#### IV. BIOCHEMICAL ANALYSIS

Chart 1 showed the presence of carbohydrate, starch and protein in *Justicia gendarussa* and *Justicia adhatoda*. The study reveals the presence of carbohydrate (5mg/100g), starch (4.5mg/100g) and protein (2mg/100g) in *Justicia gendarussa*. *Justicia adhatoda* contains carbohydrate (4mg/100g), starch (3.6mg/g) and protein (3.25mg/100g).

In the comparative study, *Justicia gendarussa* showed the presence of more amounts of carbohydrate and starch than *Justicia adhatoda*. Protein was present more amounts in *Justicia adhatoda*.

**Chart 1: Composition of Carbohydrate, Starch and Protein in *Justicia gendarussa*, Burm. F. and *Justicia adhatoda*, L.**



## V. CONCLUSION

*Justicia gendarussa* and *Justicia adhatoda* belongs to the family Acanthaceae. These plant leaves have high medicinal values. The phytoconstituents are the natural bioactive compounds found in plants. Preliminary phytochemical study and the knowledge of the chemical constituents of plants are desirable to understand herbal drug and their preparation.

*Justicia gendarussa* and *Justicia adhatoda* are traditional medicine used in treating different ailments. The phytochemical and biochemical analysis demonstrated the presence of different types of compounds. The present study on the secondary metabolites in the leaves will have way to discover new drugs. They are important for our quality of life and disease free life.

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