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Research Article

Preliminary Phytochemical Analysis Of *Justicia Adhatoda* leaves Extract Using Different Solvents

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Abstract

Plants have played a critical role in maintaining human health and civilizing the quality of human life for thousands of years. *Justicia adhatoda* is a well-known Indian medicinal plant valued for their pharmacopeia.This plant has been used commonly in ayurvedic system of medicine. This plant root, bark, leave and flower are used to heal many types of infection.The present paper gives an account of phytochemical activities. The extracts were subjected to qualitative phytochemical screening using standard procedures. Five solvents namely acetone, methanol, ethyl acetate, chloroform and diethyl ether were used to obtain extracts from powdered plant leaves.This result showed that many of the phytochemicals were present in this plant. The qualitative analysis revealed the presence of alkaloids, flavonoids, glycosides, cardiac glycosides, coumarins, hydroxyanthraquinones, tannins, phlobatannins, Proteins, xanthoprotein, steroids and phenols. The diversity of phytochemicals found present suggests that *J.adhatoda* leaf could serve as a source of useful drug.

Keywords: *Justicia adhatoda* leaves, fluorescence analysis, phytochemicals, drug.

INTRODUCTION

Many of the existing medicinal system such as Ayurveda, Unani, Homeopathy, Naturopathy, Sidha and other alternative medicinal system have been utilizing plants as effective medicines to cure many harmful diseases [1]. Phytochemicals have been recognized as the basis for traditional herbal medicine practiced in the past and currently en vogue in parts of the world. Various parts of the plant are used in Indian traditional medicine for the treatment of asthma, joint pain, lumber pain, sprains, cold, cough, eczema, malaria, rheumatism, swelling and venereal diseases[2]. *Justicia adhatoda* is a small evergreen herbal plant in the family *Acanthaceae*. This plant is distributed all over the plains of India and in lower Himalayan ranges.

All the parts of *J. adhatoda* has been used for their curative effects from ancient times[3].Vasicine produced by *J. adhatoda* is used for the treatment of various diseases and disorders, mostly for respiratory tract ailments. In Sweden *J. adhatoda* is classified as a natural remedy and some preparations based on protocols against cough containing an extract of *J. adhatoda* are accessible[4]. This plant has been recommended by ayurvedic physicians for the management of various types of respiratory disorders. It possesses potent bronchodilatory, expectorant, antispasmodic, antiseptic and blood-

purifying quality properties. It has been used to control both internal and external bleeding such as peptic ulcers, hemorrhoids, bleeding gums and also used for a multitude of disorders including; leprosy, blood disorders, heart troubles, fever, vomiting, loss of memory, leucoderma, jaundice, tumors, mouth troubles, sore-eye and gonorrhea. The plant is used for treatment of excessive phlegm and menorrhagia in Sri Lanka [5].

A juice made from the leaves was used as a treatment for diarrhea and dysentery, and in southern India the powdered leaves were used to treat malaria. Additionally, it was used as a folk medicine to speed delivery during childbirth. A decoction of the leaves may be used as an herbal treatment for cough and other symptoms of colds. The soothing action helps irritation in the throat and the expectorant will help loosen phlegm deposits in the airway which makes *J.adhatoda* a good remedy for sore throat. A poultice of the leaves may be applied to wounds for their antibacterial and anti-inflammatory properties. Some believe the poultice is also helpful in relieving rheumatic symptoms when applied to joints. This phytochemical study is more useful to know the phytochemicals that are present in different solvents which is helpful for several medicinal purposes.

MATERIALS AND METHODS

Sample collection

The fresh leaves of *Justicia adhatoda* was collected from Vriddhachalam, Cuddalore district, Tamilnadu state, India.The collected plant material, *i.e. J.adhatoda* leaves, were shade dried for about a week and grinded in the form of powder.

Preparation of plant extract

The dried plant leaves were powdered and extracted (25g) exclusively with 100 ml each of acetone, methanol, ethyl acetate, chloroform and diethyl ether in a soxhlet extractor for 4 hrs. The extracts were concentrated to dryness under reduced pressure and controlled temperature (40-50°C). All the extracts were preserved in a refrigerator until further use [6].

Phytochemical analysis

The phytochemical analysis of *Justicia adhatoda* leaves was carried out by the standard method that was previously described [7,8].

Fluorescence analysis test

A small quantity of dried and finely powdered leaves sample was placed on a grease free microscopic slide and added 1-2 drops of freshly prepared solution, mixed by gentle tilting the slide and waited for 1-2 minutes. Then the slide was placed inside the UV viewer chamber and viewed in day light, short (254 nm) and long (365 nm) ultraviolet radiations. The colors observed by application of different reagents in various radiations were recorded [9,10].

RESULTS AND DISCUSSION

The present study was carried out on the plant *J.adhatoda* leaves to reveal the presence of medicinally active constituents and its pharmacognostical properties. Pharmacognostical and physicochemical studies, being reliable and inexpensive, play an important role in quality control issues of the crude drug samples [11]. Current investigation confirms the presence of phytochemicals in different extracts of *J.adhatoda*.

Physicochemical characteristics

The dried and powdered leaf was green in colour and has a bitter taste in nature. The leaf powder has a strong odour.

Results of phytochemical analysis of *J.adhatoda* leaves extracts

The medicinal value of these plants lies in some chemical active substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds [12].

The qualitative phytochemical analysis of different extracts of *J.adhatoda* leaves was showed in Table.1. The phytochemical analysis results revealed that the presence of alkaloids, flavonoids, glycosides, tannins, proteins, phenols and resins in acetone, methanol, ethyl acetate, chloroform and diethyl ether extracts.

The research investigation reported that alkaloids are present in the leave extract of *J. adhatoda*. Alkaloids are a group of naturally occurring chemical compounds and chief class of plant secondary me-

tabolites. They are bitter to taste and are toxic to other organisms[13]. Alkaloids are present in high concentration in ethyl acetate extract and the concentration is moderate in acetone, chloroform and diethyl ether extract respectively.

Table.1: Preliminary phytochemical screening of extracts of powdered leaves of *Justicia adhatoda*

S.No	Name of the compounds	Name of the polar solvents			Name of the non-polar solvents	
		acetone	methanol	ethyl acetate	chloroform	diethyl ether
1	alkaloids	++	+	+++	++	++
2	flavonoids	+++	-	+++	+	+
3	carbohydrates	-	-	+	-	-
4	glycosides	+++	-	+	-	-
5	cardiac glycosides	+++	-	-	-	-
6	coumarins	+	+	+	+	-
7	saponins	-	-	-	+	-
8	hydroxyanthraquinones	+	+	+	-	-
9	tannins	+	-	+	+	+
10	phlobatannins	+	+	-	-	-
11	proteins	++	-	-	++	+
12	xanthoprotein	+	+	+	+	+
13	amino acids	-	-	-	-	-
14	steroids	+	+	-	-	-
15	terpenoids	-	-	-	-	-
16	phenols	+	+	+	++	+
17	resins	+	+	+	+	+
18	volatile oil	+	-	+	+	-
19	fatty acid	+	-	-	-	-
20	emodins	+	-	-	-	+

Note: + → present in small concentration; ++ → present in moderately high concentration; +++ → present in very high concentration; - → absent

Flavonoids are present in the leaf extracts of the plant. They are a group of polyphenolic compounds that have potent antimicrobial [14], anti-inflammatory [15,16] actions. Flavonoids are free radical scavengers which prevent oxidative cell damage and have strong anticancer activity[17].In our findings the flavonoids were identified in very rich concentration in acetone and ethyl acetate extract and least concentration in chloroform and diethyl ether extracts.

Phytochemical analysis results showed that glycosides and cardiac glycosides are rich in acetone extract and least in ethyl acetate concentration. Glycosides are a molecule in which a sugar is bound to a non-sugar moiety usually a small organic molecule by glycosidic bond. A class of glycosides known as cardiac glycosides have an important role in medicine because of their action on heart and used in cardiac insufficiency[18].

Phenols are one of the largest and most ubiquitous groups of plant metabolites. A number of biological properties such as anti apoptosis, anti ageing, anti carcinogen, anti-inflammatory and cell proliferating activities are attributed with phenolics[19]. In our recent research studies coumarins, tannin, phenols and resins are present in least concentra-

tion in acetone, methanol, ethyl acetate and chloroform extracts respectively. Tannin has been used since past as tanning agents as they possess astringent, anti-inflammatory, antidiarrheal, antioxidant and antimicrobial activities [20].

Based on this results acetone, ethyl acetate and chloroform extracts showed the presence of different types of phytochemicals when compared to other extracts. When compared to these five extracts, acetone having the very good phytochemical profile.

Fluorescence analysis

The ultra violet light produces fluorescence in several natural products, which do not noticeably fluoresce in daylight. If the substances themselves are not fluorescent, they may often be rehabilitated into fluorescent derivatives or decomposition products by applying diverse reagents. Therefore, some crude drugs are often assessed qualitatively in this technique and it is an imperative parameter of pharmacological evaluation.

Fluorescence is the phenomenon exhibited by various chemical constituents present in the plant material. Some show fluorescence in the visible range in daylight. The ultraviolet light produces fluorescence in many natural products which do not visibly fluoresce in daylight. Some of the substances may be often converted into fluorescent derivatives by using different chemical reagents though they are not fluorescent, hence we can often assess qualitatively some crude drugs using fluorescence as it is the most important parameter of pharmacognostical evaluation[21,22].

Fluorescence analysis of leaf powder was carried out after treating with several solvents. Fluorescence efficiency was observed at 254 and 365 nm respectively and comparative studies are carried out and are represented with colour changes role in visible light. The observations in the Table.2 showed the variation in colour.

Table.2: Fluorescence analysis of powdered leaves of *Justicia adhatoda*

S.no	Chemical Treatment	Day light	UV Light	
			254 nm	365 nm
1.	Powder +1M H_2SO_4	Pale greenish yellow	Violet	Violet
2.	Powder+10% $CuSO_4$	Green	Purple	Purple
3.	Powder+ 1M HCl	Brown	Violet	Violet
4.	Powder+Diluted HNO_3	Brown	Violet	Violet
5.	Powder+ 10% NaOH	Green	Green	Green
6.	Powder+1% glacial acetic acid	Green	Pale Green	Green
7.	Powder+Concentrated HNO_3	Brown	Green	Green
8.	Powder+ Concentrated HNO_3+ Diluted HNO_3	Pale Yellow	Pale Yellow	Pale Yellow
9.	Powder+ 1% Iodine	Pale Yellow	Purple	Purple
10.	Powder+ Ethanol	Green	Pink	Pink

Based on the above findings, the results confirmed that this plant was very important medically because of the presence of wide variety of phytochemicals. The extract needs further investigation for the mechanism of action and potential to be employed in various human ailments.

CONCLUSION

The selected material plant *Jusicia adhatoda* plants are the source of the secondary metabolites ie., alkaloids, flavonoids, glycosides, cardiac glycosides, coumarins, xanthoprotein, phenols, resins and volatile oils. Medicinal plants play a vital role in preventing various diseases. The astringent, anti-inflammatory, antidiarrheal, antimicrobial activities and antioxidant activities of the medicinal plants are due to the presence of the above mentioned secondary metabolites. Medicinal plants are used for discovering and screening of the phytochemical constituents which are very helpful for

the manufacturing of new drugs. The phytochemical analysis of the medicinal plants are also important and have commercial interest in both research institution and pharmaceutical companies for the manufacturing of the new drugs for treatment of various diseases.

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