PHYTOCHEMICAL ANALYSIS OF THE LEAVES OF *ADHATODA VASICA*

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Abstract- Medicinal plants are the important source of potential drugs in our country. *Adhatoda vasica* is an ethanomedicinal plant used since ancient times for various diseases. It has been commonly used in Ayurvedic system of medicine. The present study deals with the qualitative and quantitative phytochemical screening of the leaves of *Adhatoda vasica* in different solvents like methanol, ethanol, chloroform, petroleum ether and aqueous. The qualitative analysis of the leaves showed the presence of alkaloids, steroids, terpenoids, flavanoids, saponins, phenols, tannins, aminoacids, cardiac glycosides, carbohydrates and proteins. The quantification of the compounds like alkaloids, flavanoids and phenols were done. The results suggested that *Adhatoda vasica* has significant phytocomponents and can be used as a source of many pharmacological studies and a curative for various ailments.

***Keywords*:** *Adhatoda vasica*, Phytochemical screening, Leaves, Medicinal plant

I. INTRODUCTION

Plants have been used for health and medicinal purposes since ancient times. Natural products are the important source in drug discovery (Wise, 2008). Medicinal plants are the richest source of secondary metabolites which can act as bioactive components (Josephin sheeba and Selva mohan , 2012). Medicinal plants contain numerous biologically active compounds which are helpful in the treatment of various diseases and improving the life (Samy, *et. al.*, 2008). They are possessed to have various properties like antioxidant, anti inflammatory, anti cancer, anti diabetic, anti helminthic etc. One such traditionally used plant is *Adhatoda vasica*.

Adhatoda vasica is a small, evergreen, sub herbaceous, perennial bush distributed throughout India (Kalpesh Panara, *et. al.*, 2012). It is used in ancient ayurvedic system of medicine belonging to the family Acanthaceae and is known as "Aadathodai" in Tamil and "Malabar nut" in English (Anjaria and Bhatt, 1995). The whole plant is used to cure many human ailments. The leaves are simple, petiolate,ex-stipulate, 10-20 cm long and 3-10 cm broad, lanceolate to ovate lanceolate having crenate margin, tapering base and an acuminate apex with characteristic odour and bitter taste. The leaves are of dark green colour in above region and pale yellow below. The leaves are used to treat malarial fever, chronic fever, intrinsic hemorrhage, cough, asthma, leprosy, skin diseases, and piles (Sharma, 1996). The plant is also used as abortifacient (Wakhloo, *et. al.*, 1979). They are used as analgesic and are effective as cardiotnic (Ilango, *et. al.*, 2009). The extract of the leaves are used against ringworm (Khare, 2007).

The present study is to determine the phytoconstituents of *Adhatoda vasica* in different solvents by qualitative and quantitative phytochemical screening.

II. MATERIALS AND METHODS

2.1 Collection of plant sample

The leaf was collected from Trichy district, Tamil Nadu, India.

2.2 Preparation of the extract

The leaves of *Adhatoda vasica* were washed thoroughly in tap water to remove dust particles. The leaves were then dried in shade at room temperature and coarsely powdered by a mechanical grinder. The dried powdered sample was soaked in different solvents like methanol, ethanol, chloroform and petroleum ether for 3 to 5 days. Aqueous extract of the leaves were also prepared by soaking the dried powder in distilled water. After 5 days, the extracts were filtered using No.1 Whatman filter paper and stored in air tight container for further analysis.

2.3 Qualitative analysis of phytochemicals

Preliminary phytochemical screening was carried out (Harborne, 1980) and (Karthiswaran, 2010).

2.3.1 Test for alkaloids (Mayer's test)

To 1ml of extract, 1 ml of Mayer's reagent (Potassium iodide solution) was added. Formation of whitish yellow or cream coloured precipitate indicates the presence of alkaloids.

2.3.2 Test for steroids (Libermann Burchard test)

To 1ml of extract, 2ml of acetic anhydride and 2ml of concentrated sulphuric acid were added. Formation of violet to blue or green colour indicates the presence of steroids.

2.3.3 Test for terpenoids (Salkowski test)

To 1 ml of extract, 2ml of chloroform and few drops of sulphuric acid were added. Formation of reddish brown ring indicates the presence of terpenoids.

2.3.4 Test for flavanoids (Alkaline reagent test)

To 1 ml of extract, few drops of dilute ammonium solution and few drops of concentrated hydrochloric acid were added. A yellow colouration indicates the presence of flavanoids.

2.3.5 Test for saponins (Froth test)

To 1 ml of extract, 5 ml of distilled water was added and shaked vigorously. Formation of froth indicates the presence of saponins.

2.3.6 Test for phenols (Lead Acetate test)

To 1ml of extract, 1 ml of lead acetate solution was added. Formation of precipitate indicates the presence of phenols.

2.3.7 Test for tannins (Lead acetate test)

To 1ml of extract, 1ml of lead acetate was added. A formation of white precipitate indicates the presence of tannins.

2.3.8 Test for tannins (Ferric chloride test)

To 1ml of extract, 1ml of ferric chloride solution was added. Formation of blue, black or brownish green colour indicates the presence of tannins.

2.3.9 Test for cardiac glycosides (Keller killiani test)

To 1ml of extrct, 5ml of distilled water was added and evaporated to dryness. Then to the Sample 2ml of glacial acetic acid containing trace amount of ferric chloride solution was added. Then 1ml of concentrated sulphuric acid was added along the sides of the tube. Formation of brown ring underlayed with blue colour indicates presence of cardiac glycosides.

2.3.10 Test for aminoacids (Ninhydrin test)

To the 1ml of sample, 3 to 4 drops of Ninhydrin solution was added and boiled in water bath for 10 minutes. Formation of purple or blue colour indicates the presence of amino acids.

2.3.11 Test for proteins (Biuret test)

To the 1ml of extract, 1ml of 40% sodium hydroxide solution and 2 drops of 1% copper sulphate solution were added. Formation of violet colour indicates the presence of proteins.

2.3.12 Test for carbohydrates (Barfoed test)

To the 2ml of extract, 1ml of Barfoed's reagent was added and boiled in water bath for few minutes. Formation of reddish brown precipitate indicates the presence of carbohydrates.

2.3.13 Test for reducing sugars (Fehling's test)

To the 1ml of extract, equal quantities of Fehling solution A and B were added and heated. Formation of brick red precipitate indicates the presence of reducing sugars.

2.4 Quantitative estimation of phytochemicals

2.4.1 Alkaloid determination

5 gm of sample was added to 200 ml of 10% acetic acid in ethanol in a beaker. The beaker was tightly covered and allowed to stand for 4 hours. This was filtered and the extract was concentrated on a water bath to one quater of the original volume. The entire solution was precipitated by the drop wise addition of concentrated ammonium hydroxide solution. The precipitate was collected and washed with dilute ammonium hydroxide and filtered. The residue is alkaloid, which was dried and weighed (Harborne, 1980).

2.4.2 Flavanoid determination

10 gm of sample was added to 100 ml of 80% aqueous methanol in a beaker. The whole solution was filtered through Whatman filter paper No.42 (125mm). The filtrate was then evaporated to dryness and weighed (Harborne, 1980).

2.4.3 Determination of total phenols

Few grams of sample were boiled with 50 ml of ether for 15 minutes for the extraction of phenols. To the 5ml of extract, 10 ml of distilled water, 2ml of ammonium hydroxide solution and 5ml of concentrated amyl alcohol were added. The samples were left for 30 minutes. This was measured at 505 nm (Harborne, 1980).

III. RESULTS AND DISCUSSION

The qualitative phytochemical analysis of the leaves of *Adhatoda vasica* is summarized in the Table 1. The quantification of important phytocompounds of the leaves of *Adhatoda vasica* is summarized in Table 2. The methanolic extract of leaves shows the presence of high number of phytocompounds when compared with other solvents like ethanol, petroleum ether, chloroform and aqueous. It shows the presence of alkaloids, steroids, terpenoids, phenols, tannins, saponins, proteins and amino acids. Phytochemicals such as saponins, terpenoids, and alkaloids have hypoglycemic activities (Cherian and Augusti, 1995). The leaves show the presence of tannins and they play a major role in the treatment of intestinal disorders like diarrhoea and dysentery (Akinpelu and Onakoya, 2006). The leaves also have terpenoids which can act as antioxidants. Phytochemicals have highest therapeutic efficiency in pharmaceutical field (Thilagavathi, *et. al.*, 2015). This paves way for further studies on isolation and identification of specific phytocomponents for pharmacological studies.

Table 1: Qualitative phytochemical analysis of the leaves of *Adhatoda vasica*

TESTS	METHANOL	ETHANOL	PETROLEUM ETHER	CHLOROFORM	AQUEOUS
ALKALOID	+	+	-	-	+
STEROIDS	+	+	+	+	-
FLAVONOIDS	-	-	-	-	+
TERPENOIDS	+	+	+	-	+
SAPONINS	+	+	+	+	+
PHENOLS	+	+	-	+	+
TANNINS	+	+	-	-	-
CARDIAC GLYCOSIDES	+	-	+	+	-
AMINOACIDS	+	-	+	-	+
PROTEINS	+	-	+	-	+
CARBOHYDRATES	+	-	+	-	-
REDUCING SUGARS	+	-	+	+	-

Table 2: Quantitative phytochemical analysis of the leaves of *Adhatoda vasica*

TESTS	METHANOL	ETHANOL	PETROLEUM ETHER	CHLOROFORM	AQUEOUS
ALKALOID	7.66 ± 0.08	6.56 ± 1.20	1.25 ± 0.67	1.32 ± 1.0	7.45 ± 1.23
FLAVONOID	2.03 ± 0.02	3.01 ± 1.0	3.85 ± 0.04	0.09 ± 0.01	6.15 ± 0.08
PHENOLS	15.33 ± 1.35	13.25 ± 2.3	5.09 ± 0.09	10.09 ± 2.12	14.72 ± 1.32

IV. CONCLUSION

The qualitative and quantitative analysis shows that the leaves of *Adhatoda vasica* contain important bioactive components such as alkaloids, steroids, terpenoids, phenols, tannins, proteins, amino acids and saponins. The methanolic extracts are rich in phytoconstituents when compared with other extracts. From this study it is evident that the plant *Adhatoda vasica* is valued with bioactive components. Further researches are being undertaken to isolate the bioactive components and to identify its properties in the field of medicine.

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