

Quantitative Phytochemical Analysis of Aqueous Leaf Extract of *Boerhaviadiffusa*

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Abstract: *Boerhaaviadiffusa* is one of the renowned medicinal plants used to treat large number of human ailments as mentioned in Ayurveda, Charaka Samhita, and Sushrita Samhita. The Plant in whole or its peculiar parts (Aerial parts and Roots) have anumerous medicinal properties and are used by endemic and tribal people in India. The phytochemical properties are important to classify plant chemical constituents because such knowledge will be of interest for the synthesis of complex chemical substances. Plants are known to have a wide range of secondary metabolites in them. The present study was aimed to evaluate the phytochemical constituents of leaf extracts of *B.diffusa*. This study showed the presence in *Boerhaaviadiffusa* pharmacologically active compounds such as alkaloids, flavonoids, steroids, phenols and tannin.

Keywords: *Boerhaviadiffusa*; Phytochemical Properties; Phytochemical Constituents; Bioactive Compound

I. INTRODUCTION

India is a vast repository of medicinal plants that are used in traditional medical treatments (Chopra *et al.*, 1956). The various indigenous systems such as Siddha, Ayurveda and Unani use several plant species to treat different ailments (Rabe and Staden, 1997). Plants have been associated with the human health from time immemorial and they are the important sources of medicines since the down of human civilization. In spite of tremendous development in the field of allopathic medicines during 20th century, plants still remain one of the major sources of drugs in modern as well as in traditional systems of medicine.

Tribal community is using their traditional knowledge system to cure different diseases. They use plant as a source of drug through trial and error method and the process is experienced over hundreds of years, which says that the medicinal plants have been in the focus as lifesaving drugs right from thebeginning of the human civilization. The medicinal plants have been the object of research in both systematic and advanced areas of plant sciences(Patil H.M., 2012). The traditional knowledge of these herbal recipes is popular among the indigenous and local communities. Even today the Tribal communities are solely dependent on plants for their medication; hence they are using them against different. They have preserved the wealth of traditional knowledge as a part of their belief and customs. They are practicing these methods generation after generation successfully (Patil Sunil J. and Patil H.M.,2012).

Herbal medicines as the major medication in traditional system of medicine have been used in medical practices since antiquity. The practices continue today because of the biomedical benefits as well as place in cultural beliefs in many parts of the world and have made a great input towards maintaining human health (Sane, 2002).Herbal medicine or

phytomedicine is the use of plants for medicinal and therapeutic purpose for curative of diseases and improve human health. Medicinal plants are serving as raw material for drugs which are efficient and rational health care for people. However, all plants synthesize phytochemicals, which are beneficial for our health as they cannot be synthesized in the human body [Martinez MJA, et al .,2008]. Plants are also rich dietary sources of biomolecules, vitamins and minerals which are crucial for maintaining the healthy body. It has been observed that abundant plants have pharmacological effects due to the presence of metabolites. Plant-metabolites are organic compounds which can be classified into primary metabolites and secondary metabolites. Primary metabolites are organic compounds include glucose, starch, polysaccharide, protein, lipids and nucleic acid which are beneficial for growth and development of the human body. Plants synthesize secondary metabolites which include alkaloids, flavonoids, saponins, terpenoids, steroids, glycosides, tannins, volatile oils etc., The therapeutic efficacy of plants is because of these secondary metabolites for curing many diseases. Phytochemicals are pharmacologically active compounds. These include alkaloids have an antispasmodic, antimalarial, analgesic, diuretic activities; Terpenoids are known for their antiviral, anthelmintic, antibacterial, anticancer, antimalarial, anti-inflammatory properties; Glycosides are reported for antifungal and antibacterial properties; Phenols and flavonoids have an antioxidant, anti-allergic, antibacterial properties etc. and Saponins are reported to have anti-inflammatory, antiviral, plant defence activities (Maurya R., ,et al. 2008, Chopra A et al.,2002).

The concentration of phytochemicals is different in different parts of the same plant and in different plants. The therapeutic efficacy of plants is because of these compounds which include alkaloids, flavonoids, saponins, terpenoids, steroids, phlobatannins, glycosides, tannins, etc. All these secondary metabolites are known for curing one or other diseases. For eg. Alkaloids are known for antispasmodic, antimalarial, analgesic, diuretic activity. Terpenoids are reported to have antiviral, anthelmintic, antibacterial, anticancer, antimalarial, anti-inflammatory properties. They are also known for inhibition of cholesterol synthesis and possess insecticidal properties hence useful for storing agricultural products. Saponins are known for anti-inflammatory, antiviral, plant defence and for cholesterol reducing property. Phlobatanins possess astringent properties. Glycosides are reported for antifungal and antibacterial properties. Phenols and flavonoids are known for their antioxidant, anti-allergic, antibacterial, etc(Padalia H and Chanda S.2015, MoteriyaP,et al., 2015)

II. MATERIALS AND METHODS

PLANT MATERIAL

The leaves of *Boerhaavia diffusa*, are collected from Javadhu hills near by Tiruvannamalai District, Tamilnadu, India. The plant materials were cleaned with distilled water and shade dried at room temperature.

PREPARATION OF PLANT EXTRACTS

Crude sample extract was prepared by Soxhlet extraction method. About 20gm of powdered material was uniformly packed into a thimble and extracted with 250ml of methanol separately. The process of extraction has to be continued for 24 hours or till the solvent in siphon tube of extractor become colorless. After that the extract was taken in a beaker and kept on hot plate and heated at 30-40°C till all the solvent got evaporated. Dried extract was kept in refrigerator at 4°C till future use.

III. QUANTITATIVE PHYTOCHEMICAL ANALYSIS

Estimation of Alkaloids

Alkaloid determination using Harborne (1973) method. 5g of the sample was weighed into a 250 ml beaker and 200 ml of 10% acetic acid in ethanol was added and covered and allowed to stand for 4 h. This was filtered and the extract was concentrated on a water bath to one quarter of the original volume. Conc ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitated was collected and washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloid, which was dried and weighed.

Estimation of Flavonoids

Ten grams of plant sample was repeatedly extracted with 100ml of 80% aqueous methanol at room temperature. The mixture was then filtered through a filter paper into a pre-weighed 250ml beaker. The filtrate was transferred into a water bath and allowed to evaporate to dryness and weighed. The percentage flavonoid was calculated by difference (Krishnaiah et al, 2009)

Determination of Total phenols

The fat free sample was boiled with 50 ml of ether for the extraction of the phenolic component for 15 min. 5 ml of the extract was pipetted into a 50 ml flask, then 10 ml of distilled water was added. 2 ml of ammonium hydroxide solution and 5 ml of concentrated amyl alcohol were also added. The plant samples were made up to mark and left to react for 30 min for colour development. This was measured at 505nm (Siddhuraju and Decker, 2003).

Total Tannins Content Determination:

The tannins were determined by slightly modified Folin and Ciocalteu method. Briefly, 0.5 ml of sample extract is added with 3.75 ml of distilled water and added 0.25 ml of Folin Phenol reagent, 0.5 ml of 35% sodium carbonate solution. The absorbance was measured at 725 nm. Tannic acid dilutions (0 to 0.5mg/ml) were used as standard solutions. The results of tannins are expressed in terms of tannic acid in mg/ml of extract

Estimation of Steroids

1ml of test extract of steroid solution was transferred into 10 ml volumetric flasks. Sulphuric acid (4N, 2ml) and iron

(III) chloride (0.5% w/v, 2 ml), were added, followed by potassium hexacyanoferrate (III) solution (0.5% w/v, 0.5 ml). The mixture was heated in a water-bath maintained at 70±20 C for 30 minutes with occasional shaking and diluted to the mark with distilled water. The absorbance was measured at 780 nm against the reagent blank.

Quantitative Phytochemical Analysis of *Boerhaavia diffusa*:

Result and discussion:

Analysis of plant bioactive compounds is important for determining its medicinal value (Sasidharan et al., 2011). This study showed the presence in *Boerhaavia diffusa*, (Table-1, Figure-1) of pharmacologically active compounds such as alkaloids, flavonoids, steroids, phenols and tannin. Many medicinal plants are over-exploited, and are at risk of extinction (Bentley, 2010).

The *Boerhaavia diffusa* aqueous sample underwent quantitative phytochemical analysis. Estimated alkaloids, flavonoids, steroids, phenols, and tannin have been analysed, showing more activity in phenolic content. Phenols (42.78%) are found to be present in higher amounts in phytochemicals: Alkaloids (5.27%), Flavonoids (8.63%), Steroids (1.26%) and Tannin (2.15%). Phenolics are the widest spread of secondary metabolites within the plant kingdom. Phenolic are the most wide spread secondary metabolites within the plant kingdom. These are very important constituents of plants because of their scavenging ability on free radicals due to their hydroxyl groups (Cao et al., 1997). Phenolic content of plants directly contributes to antioxidant action. The phenolic compounds have a high redox potential which enables them to serve as reduction agents, hydrogen donors and single-oxygen quenchers (Kahkonen et al., 1999).

Alkaloids have a wide range of pharmacological properties including antimalarial, antiasthma, anticancer properties as reported by (Kittakoop, P et al., 2014.) The plants have antioxidant, antiinflammatory, antiallergic, anticarcinogenic, a nti-microbial, hepatoprotective and anti-viral abilities properties due to the presence of flavonoids which was reported to have the above mentioned properties (O'Neil et al, 2000)secondary metabolic in plants such as phenolic compounds are essential for plant growth, reproduction prevent chronic illness such as cardiovascular disease certain type of cancers enhances and hormone modulators(Okwu,D.E and Omodamino,O.D ,2005).

Phenols are reported to possess the ability to block specific enzymes that cause inflammation and to prevent diseases (Okwu D E 2004). So far as plant phenolics constitute one of the major groups of compounds acting as primary antioxidants on free radicals terminators. It was responsible to determine their total amount in the selected plant extracts (Cook and Samman1996).The phenols contain hydroxyls that are responsible for the radical scavenging effect mainly due to redox properties (Rice-Evans et al 1997).

Table:1 Quantitative Phytochemical Analysis of *Boerhaavia diffusa* in Aqueous Extract

S.No	Phytoconstituents	Values (%)
1	Alkaloids	5.27
2	Flavonoids	8.63
3	Steroids	1.26
4	Phenols	42.78
5	Tannin	2.15

According to our study the high phenol content in *B. diffusa* can explain its high free radical scavenging activity the result of the present study suggests that selected plants can be used as a source of antioxidants for pharmacological preparations is well evidence by the present work.

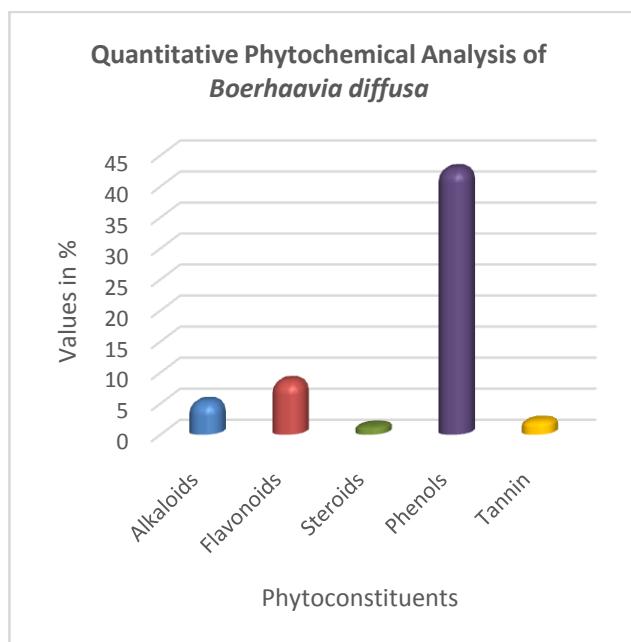


Figure: 1 Quantitative Phytochemical Analysis of *Boerhaavia diffusa* in Aqueous Extract

CONCLUSION

It can be concluded that the source of secondary metabolites like flavonoids, alkaloids, steroids, tannin and phenols are present in the selected medicinal plant. Because of the presence of these secondary metabolites the selected medicinal plant has high healing potential. These phytochemicals render the medicinal values of the studied plant.

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