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Research Article

Physicochemical Analysis of Medicinal Herbs, *Eclipta Alba* (L.) Hassk and *Lippia Nodiflora* (Linn.)

T. Regupathi* and K. Chitra[1]
* Ultra College of Pharmacy, Madurai – 625 104, Tamil Nadu, India
[1] Department of Pharmaceutical Chemistry, Sri Ramachandra University, Chennai – 600 116, Tamil Nadu, India

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Abstract

The present study comprises physicochemical evaluation of aerial parts of *Eclipta alba* and *Lippia nodiflora* by using standard methods in order to explore the authentic plant material suitably for its traditional claims. The physical evaluation was carried out for the determination of physicochemical profile such as ash values and extractive values of *E. alba* and *L. nodiflora.* More water soluble ash value appears in *E. alba* denotes that this plant powder ash is more soluble to water compared to the other ashes, whereas in *L. nodiflora* water soluble ash value is less than the acid insoluble ash value. *E. alba* water extractive value of 17.56% showed that water permeates the cells of the aerial parts and thus, a better extractive compared to alcohol with extractive value of 10.27%. Whereas in *L. nodiflora* water soluble extractive value is less (9.42%) compared to alcohol soluble extractive value of 18.63% which shows water that much not permeates the cells of the aerial parts of *L. nodiflora* compared to *E. alba.* This study will useful in development of a suitable monograph, determining the quality and purity of a crude drug and laying down Pharmacopoieal standards for *E. alba* and *L. nodiflora.*

1. INTRODUCTION

India has one of the oldest, richest and most diverse cultural traditions associated with the use of medicinal plants. Plants have been used extensively as medicine for the treatment of various ailments throughout human history and even today this trend continues. According to the World Health Organization (W.H.O), approximately 75-80% of the world's population use plant-based medicines. All plants may not be as useful as claimed, or may have more therapeutic properties than are known traditionally. Therefore, proper scientific knowledge is required to investigate and explore the exact standardization of such medicinally important plants[1].

Eclipta alba commonly known as false daisy, belonging to the family Asteraceae. *E. alba* is a small and erect annual herb. Its stem is usually erect, flat or round, blackish green, profusely branched and pubescent. Leaves are opposite, serrate, 3 to 5 cm long and blackish green in colour. The whole plant and seeds have great medicinal value. *E. alba* is equally useful both, internally as well as externally. The chronic and infected wounds get cleansed and heal better with application of its paste. The medicated oils of *E. alba* is widely used as hair tonic and to prevent hair fall and premature graying of the hair. *E. alba* is reported in literature for its various biological activities such as: calm the mind, removes memory disorders, relieve swollen glands, strengthens spleen, works as a general tonic, useful for treatment of edema, fevers and rheumatic joint pains, stimulate digestion, hepatitis, enlarged spleen, antioxidant activity and skin disorders[2].

The genus *Lippia* (Verbenaceae) includes approximately 200 species of herbs, shrubs and small trees. Most of these species are traditionally utilized as remedies for some diseases[3]. *Lippia nodiflora* Linn.is a perennial herb which grows in a humid environment near river banks, in tropical and subtropical regions. The aerial parts of the plant have medicinal properties and are used in many countries.

Corresponding Author:
Mr. T. Regupathi,
Ultra College of Pharmacy, 4/235, College Road,
Thasildar Nagar, Madurai – 625 020, Tamil Nadu, India
Email: poornareg@yahoo.co.in
Mobile Number: +91-9443432476

The plant contains a variety of constituents such as triterpenoids, flavonoids, phenols, steroids, and many others. Among these flavonoids were the most commonly found constituent.Nodifloretin (3), β-sitosterol glycoside and stigmasterol glycoside from the leaves of *L .nodiflor* [4]. Nodifloridin A (1) and Nodifloridin B(2) along with lactose, maltose, glucose, fructose, and xylose were isolated from the plant[5]. The plant is used as gastroprotective effect[6], anti inflammatory,antineoplastic[7], antioxidant[8] and diuretic[9]. The plant is used for the treatment of diuretic, aphrodisiac, diseases of heart, ulcers, bronchitis, fever and colds[10]. The plant made into a poultice used as maturant for boils, infusion of leaves and tender stalks given to children in indigestion and to women after delivery. *Chutney* made from its leaves and fruits are eaten to relive the irritation of internal piles[11, 12].

The objective of the present investigation, medicinal importance of the afore-mentioned herbs was evaluated for the physiochemical analysis.

2. MATERIALS AND METHODS

2.1 Collection of plant materials

The plant specimen for the proposed study *Eclipta alba* (L) Hassk and *Lippia nodiflora* (Linn.) was collected from the paddy fields and other irrigated fields in and around Madurai District, Tamil Nadu, India.

2.2 Preparation of plant material

The collected *E. alba* and *L. nodiflora* aerial parts were washed with tap water. The plants were cut in to small pieces and air-dried thoroughly under shade (at room temperature) for 2 months. The shade dried materials were powdered using the pulverizer and sieved up to 80 meshes. It was then homogenized to fine powder, weighed and stored in air tight container for further analysis. This powder material was used for the analysis of physicochemical properties.

2.3 Determination of physicochemical parameters

Physicochemical constants such as the percentage of total ash content, acid insoluble ash, water soluble ash, water and alcohol

soluble extractives and loss of weight on drying were calculated based on standard procedures[13].

2.4 Determination of loss on drying

The loss on drying is the loss of weight in percentage w/w resulting from water and volatile matter of any kind that can be driven of under specified conditions. The test was carried out on well mixed sample of the substance.1 gm of aerial parts of *E. alba* and *L. nodiflora* were transferred into a petridish plate and the contents were distributed evenly to a depth not exceeding 10 mm. The loaded plate was heated at 105^{0}C in hot air oven for 1 hr and then cooled in desiccators, loss in weight was recorded as moisture content. Respective moisture content percentage of the samples was calculated.

2.5 Determination of total ash value of *E. alba* and *L. nodiflora*

The total ash was determined by incinerating 2 g of air – dried coarsely powdered drug in a tarred silica crucible which was previously ignited and cooled before weighing. The drug was incinerated by gradually increasing the heat in a muffle furnace at 450^{0}C for 4 hrs. The ignition was repeated until constant weight was obtained. After complete incineration, it was cooled in a desiccator. Then the percentage of the total ash with reference to air – dried drug was calculated.

2.6 Acid – insoluble ash

The ash was washed from the crucible into 100 ml beaker using 25 ml of 2 N HCl. It was then boiled for 5 min over a Bunsen burner and filtered through an ashless filter paper (Whatman No: 42). The residue was washed with hot water twice, ignited to ash, cooled in desiccators and weighed. The residue was weighed and the acid insoluble ash of the drug was calculated with reference to the air dried sample of crude drug.

Acid insoluble ash value is frequently necessary to evaluate the crude drugs. This ash value indicates contamination with silicaceous material e.g. earth and sand. The comparison of this with the total ash value of the sample will differentiate between contaminating minerals and variations of the natural ash of the drug.

2.7 Water – soluble ash

Water soluble ash is a good indicator of either previous extraction of the water soluble salts in the drug or incorrect preparation. The ash was washed from the crucible into 100 ml beaker using 25 ml of chloroform water and it was boiled for 5 min over a bunsen burner and filtered through ash less filter paper (Whatmann No: 42). The residue was washed with hot water twice, ignited to ash cooled and weighed. The weight of insoluble matter was subtracted from the weight of ash. The difference in weight represents the water soluble ash. The percentage of water - soluble ash was calculated with reference to air – dried drug.

2.8 Determination of alcohol soluble extractive value of *E. alba* and *L. nodiflora*

Alcohol is an ideal solvent for extraction of various chemicals like tannins, resins. Therefore this method is frequently employed to determine the approximate resin content of drug. Generally 95% ethyl alcohol is used for determination of alcohol soluble extracts. Alcohol soluble extracts are one of the tools for standardization of crude drug.

Macerated 5 g of dried coarse powder of plant material with 100 ml of 90% ethanol in a closed flask for 24 h, shaking frequently during 6 h and allowing to stand for 18 h. It was filtered immediately taking precaution against loss of alcohol and 25 ml of filtrate was evaporated to dryness in a tarred flat bottomed shallow dish and dried at 105^0 C and weighed. The percentage of alcohol soluble extractive was calculated with reference to air dried drug.

2.9 Determination of water soluble extractive value of *E. alba* and *L. nodiflora*

Determination of water soluble extractive value is used for evaluating crude drugs which are not readily estimated by other means. The extracts obtained by exhausting crude drugs are indicative of approximate measure of their chemical constituents. This method is applied to drugs which contain water soluble active constituents of crude drugs such as tannins, sugars, plant acids, mucilage and glycosides. The water soluble extractive value can be used to indicate poor quality, adulteration with any unwanted material or incorrect processing of the crude drug during the process of drying and storage.

About 5 g of powdered plant material was added to 50 ml of water at 80^0 C in a stoppered flask. It was shaken well and allowed to stand for 10 minutes. It was cooled to 15^{0}C, 2g of kieselghur was added into it and filtered. Transferred 5 ml of the filtrate to a tarred evaporating basin and evaporated on a water bath and the residue was weighed. The percentage of water soluble extractive was calculated with reference to air dried drug.

3. RESULTS AND DISCUSSION

Physicochemical parameters of powder as shown in the Table 1 were in compliance with those mentioned in Ayurvedic Pharmacopoeia of India. The percentage of loss of weight on drying, total ash, acid insoluble-ash, water-soluble ash and sulphated ash were obtained by employing standard methods of analysis. The percentage of alcohol soluble extractive value and water soluble extractive value were also determined and the results are depicted in Table 1.

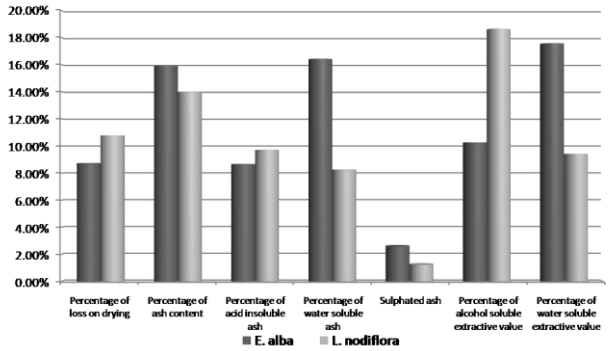
The determination of physicochemical parameter is important in determination of adulterants and improper handling of drugs. Ash values are important quantitative standards[14] and criterion to analyze the identity and purity of crude drugs especially in the powder form[15]. Moreover the total ash of a crude drug also reflects the care taken in drug preservation, and the purity of crude and the prepared drug[16]. Acid insoluble ash is a part of total ash and measures the amount of silica present, especially as sand and siliceous earth. Water soluble ash is the water soluble portion of the total ash. The total ash content of *E. alba* is 15.91% and *L. nodiflora* is 13.97%. Water soluble ash for *E. alba* and *L. nodiflora* are 16.42% and 8.25% respectively. More water soluble ash value appears in *E. alba* denotes that this plant powder ash is more soluble to water compared to the other ashes, whereas in *L. nodiflora* water soluble ash value is less than the acid insoluble ash value. Percent weight loss on drying or moisture content was found to be 8.73% for *E. alba* and 10.78% for *L. nodiflora* (Figure 1).

Extractive values obtained from *E. alba* and *L. nodiflora* using water and alcohol were recorded in table 1. It is useful for the evaluation of a crude drug as it gives an idea about the nature of chemical constituents present in it and is useful for estimation of chemical constituents, soluble in that particular solvent used for extraction[17].The water soluble extractive value was indicating the presence of sugar, acids and inorganic compounds and alcohol soluble extractive values indicated the presence of polar constituents like phenols, alkaloids, steroids, glycosides, flavonoids and secondary metabolites present in the *E. alba* plant sample[18].*E. alba* water extractive value of 17.56% showed that water permeates the cells of the aerial parts and thus, a better extractive compared to alcohol with extractive value of 10.27%. Whereas in *L. nodiflora* water soluble extractive value is less (9.42%) compared to alcohol soluble extractive value of 18.63% which shows water that much not permeates the cells of the aerial parts of *L. nodiflora* compared to *E. alba*. The result of percentage extractive yield for *L. nodiflora* indicates that crude powder was highly soluble in alcohol than water.

Table 1: Physicochemical parameters of *Ecliptaalba*and *Lippianodiflora*

S. No	Physicochemical constants	*E. alba*	*L. nodiflora*
1.	Percentage of loss on drying	8.73% w/w	10.78% w/w
2.	Percentage of ash content	15.91% w/w	13.97% w/w
3.	Percentage of acid insoluble ash	8.66% w/w	9.72% w/w
4.	Percentage of water soluble ash	16.42% w/w	8.25% w/w
5.	Sulphated ash	2.62% w/w	1.27% w/w
6.	Percentage of alcohol soluble extractive value	10.27% w/v	18.63% w/v
7.	Percentage of water soluble extractive value	17.56% w/v	9.42% w/v

Figure 1. Physicochemical parameters of *E. alba* and *L. nodiflora*



4. CONCLUSION

The plant *E. alba* and *L. nodiflora* having important role in the traditional Ayurvedic, Unani systems of holistic health and herbal medicine of the east. In the present study aerial part of *E. alba* and *L. nodiflora* were thoroughly investigated for their physicochemical characters to analyze their quality, safety and standardization for their use. The information from the present study will provide data which is helpful in the correct identification and authentication of these medicinal plants and may help in preventing its adulteration. Further research is in progress regarding isolation, purification and characterization of therapeutically potent compounds from Methanolic extract, which could be subjected to pharmacological analysis in order to understand the exact action mechanism.

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