

Original Article

PHYTOCHEMICAL SCREENING, FUNCTIONAL GROUPS AND ELEMENTAL ANALYSIS OF LEAF EXTRACT OF *IPOMOEA OBSCURA* (L) KER-GAWL

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Received: 14 May 2014 Revised and Accepted: 01 Sep 2014

ABSTRACT

Objective: The aim of the study was to find out the phytochemical constituents, and to evaluate the functional group and elemental analysis of ethanol leaf extract of *Ipomoea obscura* (L.).

Methods: The secondary metabolites was analyzed for various extracts by using standard techniques. The metabolic activities can be measured by using FTIR and SEM-EDX.

Results: Phytochemical screening revealed the presence of alkaloids, glycosides, steroids, terpenoids, flavonoids, saponins and fatty acid and lipids in the extract. FTIR was used to identify various functional groups. Scanning Electron Microscope (SEM) with an energy dispersive X-ray spectrometer (EDX) showed the presence of calcium, magnesium, silicon, chloride, oxygen and potassium in ethanol leaf extract.

Conclusion: The results suggested that the ethanol leaf extracts of *Ipomoea obscura* (L.) showed the presence of most of the secondary metabolites, functional groups and trace elements.

Keywords: Phytochemical screening, FTIR, EDAX, *Ipomoea obscura*.

INTRODUCTION

Plant based drug has been used worldwide in traditional medicines for treatment of various disease. The study of medicinal plants with a history of traditional use as a potential source of substance with significant pharmacological and biological activities such as antioxidant, anticancerous and hepatoprotective [1]. Phytochemical studies have attracted the attention of plant scientists due to the development of new and sophisticated techniques. These techniques played a significant role in the search for additional resources of raw material for pharmaceutical industry [2]. *Ipomoea obscura* (L.) Commonly known as 'Lakshmana' in Ayurveda belongs to the family Convolvulaceae. It is small climbing vine, with small cordate leaves and acuminate apex. Corolla composed of five fully fused petals. Plant grows on fences or low ground cover as substrate in distributed areas [3]. Ayurveda has identified many medicinal properties of this plant and it is effectively used against dysentery, is applied on open sores and pustules. A paste of leaves is applied on ulcers, hemorrhoids and swellings [4]. It has also ornamental value as climber with attractive flowers. This plant also included as plants affecting central nervous system [5], and also actively used as an antioxidant [6]. The main objective of the study is to screen the ethanol leaf extract of *Ipomoea obscura* (L.) for its phytochemical constituents, and to evaluate the functional groups using FTIR and elemental analysis through EDAX analysis.

MATERIALS AND METHODS

Plant collection

The whole plant of *Ipomoea obscura* (L.) Used for the investigation was obtained from Madurai district, Tamilnadu, India. The plant specimen was authenticated by Dr. G. V. S. Murthy, Botanical survey of India, TNAU Campus, Coimbatore. The voucher specimen was deposited in the laboratory for future reference (BSI/SRC/5/23/2010-11/Tech). Fresh plant material was washed under running tap water then air dried and powdered.

Extraction

The plant powder was extracted with successive solvent system, petroleum ether, chloroform, ethyl acetate, ethanol and water.

Totally 100 g of dried plant powder was extracted in 500 ml of corresponding solvents for 24 hr in occasional shaking at room temperature. The supernatant was collected and evaporated to make the final volume one-fifth of the original volume. It was stored at 4°C in airtight bottles for further studies.

Phytochemical analysis

Phytochemical screening of plant extract was carried out according to the method adopted by Peach and Tracey [7].

FTIR spectrum analysis

The ethanol extract of *Ipomoea obscura* (L.) was mixed with KBr salt, using a mortar and pestle, and compressed into a thin pellet. Infrared spectra were recorded on a Shimadzu FTIR Spectrometer 8000 series, between 4,000-400 cm⁻¹.

Energy dispersive X-ray spectroscopy (EDAX Analysis)

The ethanol extract derived from plant sample of *Ipomoea obscura* (L.) was subjected to the elemental analysis using Scanning Electron Microscope (SEM) with an energy dispersive x-ray spectrometer (EDAX).

RESULTS

Phytochemical screening of plant materials

Table 1 shows the phytochemical screening of *Ipomoea obscura* (L.). Preliminary phytochemical screening of ten different secondary metabolites (Alkaloids, Cardioglycosides, Saponin, Oils and fats, Tannin and phenolic compound, Terpenoids, Flavonoids, Aminoacids and proteins, Steroids, Carbohydrates) were tested in five different extracts. Among the five different extracts, ethanol extract show the presence of the maximum number of secondary metabolites than other solvents.

Fourier transform infrared (ftir) fingerprinting analysis

Figure 1 shows the results of FTIR spectroscopic studies have revealed the presence of various functional groups in ethanol leaf extract of *Ipomoea obscura* (L.).

The peak at 3989 and 3385.07 cm^{-1} is corresponding to hydrogen-bonded O-H stretching frequency respectively. The peak at 3385.07 cm^{-1} that peak covers the entire region with a very broad peak. The peak at 2929.87 cm^{-1} to assign H-C-H stretch. The peak at 2223.92 cm^{-1} to assign C \equiv N stretch. The absorptions can be seen as several distinct peak in this region. The bands between 3000 and 2800 cm^{-1} represent C-H stretching vibrations that are mainly generated by lipids [8,9]. The more intense bands occurring at 2200.78, 2181.49, 2152.56, 2133.27 corresponding to C \equiv C stretching indicate the

presence of alkynes. The peak at 1710.86 cm^{-1} to assign C=O stretching indicate the carboxylic acid. The peak at 1627.97 cm^{-1} to assign C-C=C stretching indicate the alkenes.

The peak at 1263.37, 1055.06 cm^{-1} assigned to the C-O stretching vibration and indicate the esters. The weak absorption band of 796.60, 700.16, 617.22 cm^{-1} indicate the presence of chloride, bromide in our plant extract [10]. This O-H stretching indicate the phenolic compound, that have excellent antioxidant properties[11].

Table 1: Phytochemical screening of leaf extract of *Ipomoea obscura* (L)

Extracts	AL	SA	TP	FL	ST	CG	OF	TN	AP	CH
Petroleum ether	+	+	+	+	-	+	-	-	-	-
Chloroform	+	-	-	+	+	-	-	+	-	+
Ethyl acetate	+	-	+	+	-	+	+	+	-	+
Ethanol	+	+	-	-	+	+	+	+	+	+
Water	+	+	-	+	-	+	-	-	+	+

'+' Present		'-' Absent	
AL	Alkaloids	CG	Cardioglycosides
SA	Saponin	OF	Oils and fats
TP	Tannin and phenolic compounds	TN	Terpenoids
FL	Flavonoids	AP	Aminoacids and proteins
ST	Steroids	CH	Carbohydrates

Table 2: The percentage of trace elements present in ethanol leaf extract of *Ipomoea obscura* (L)

Element	App Conc.	Intensity Corr.	Weight%	Atomic%
O	17.36	0.884	76.03	87.55
Mg	0.48	0.632	2.96	2.24
Si	0.25	0.83	1.17	0.77
Cl	0.61	0.833	2.85	1.48
K	3.65	1.059	13.32	6.28
Ca	0.88	0.932	3.67	1.69
Totals			100.00	

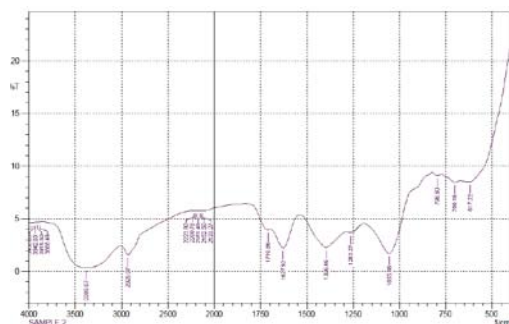


Fig. 1: FTIR Spectrum analysis of Ethanol leaf extract of *Ipomoea obscura* (L.)

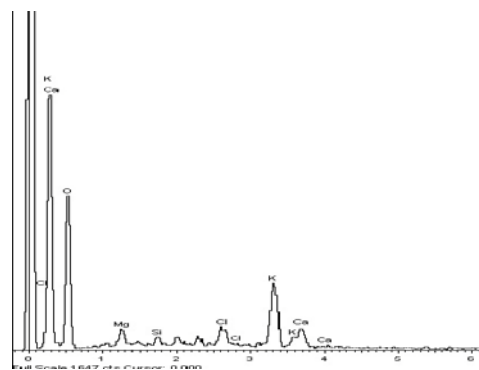


Fig. 2: The SEM EDX spectra of ethanol leaf extract of *Ipomoea obscura* (L.)

Energy dispersive X-ray spectroscopy

Table 2 shows the results of the elemental composition of *Ipomoea obscura* (L.) Using SEM and EDX technique. The SEM - EDX spectra of the ethanol extract of the *Ipomoea obscura* (L.) Shown in figure 2.

Oxygen, Magnesium, Silicon, Chloride, Pottasium and Calcium are present in *Ipomoea obscura* (L.) CaCo₃, SiO₂, MgO, KCL, MAD, Ca wollastonites are used as the standards. In all these elements, Oxygen presented as high concentration while K and Ca presented as moderate amount. But Mg, Si, Cl presented only a trace quantities. Trace elements are estimated by determining the presentage abundance (%) of elements Mg, Si, Cl, K and Ca in the sample.

DISCUSSION

Phytochemical screening is of paramount importance in identifying new source of therapeutically and industrially valuable compound having medicinal significance, to make the best and judicious use of available natural wealth[12,13]. Phytochemical investigation of the ethanolic extracts of *Ipomoea obscura* (L.) revealed the presence of various phytochemicals such as steroids, flavonoids, tannins, saponins. The presence of cardiac glycosides and alkaloids in *Ipomoea obscura* (L.) may be associated with their use by traditional medicines for the treatment of different diseases. Phenolic have attracted a great attention in relation to their potential for beneficial effects on health [14]. phytochemical analysis of plants for the

presence of saponins are widely well known to have expectorant and antitissue activity[15,16].

FTIR spectroscopy data analysis helps in understanding the chemical functionality of the compound in the plant sample and when run under IR region in the range of 400-4000 cm^{-1} there was a variation in the peak in both the plant samples[17,18]. FTIR allows detecting whole range of infrared spectram simultaneously providing speed and accuracy in measurements of biological specimens[19]. The presence of characteristic functional groups phenols, carboxylic acid, alkanes, alkenes, esters, alkynes, fatty acid and lipids are responsible for various medicinal properties of *Ipomoea obscura* (L.) Based on the functional group analysis, *Ipomoea obscura* (L.) doesn't contain any toxic compounds. In the present study, results of EDAX showed the presence of trace elements such as Mg, Si, Cl, K and Ca in *Ipomoea obscura* (L.). Deficiency of these trace elements in human subjects can occur under the most practical dietary conditions and in much diseased status[21]. Trace elements play both curative and preventive role in combating diseases. Calcium is needed in the development of bone and teeth and it regulate heart rhythm, help in normal blood clotting, maintain proper nerve and muscle functions and lower blood pressure[22]. Magnesium is important cofactor for the conversion of blood glucose into energy[23]. Potassium is essential for the transport of nutrients inside the cell. Without potassium, nutrients could not able enter into the cell that lead cell death. Silicon is also another important element to prevent the hardening of veins and arteries. Chloride works with sodium and potassium carry an electrical charge when dissolved body fluids and to regulate the pH in the body. Chloride is also important for digest the food properly and absorb many elements. The presence of these trace elements in *Ipomoea obscura* (L.) marks its use in therapeutic purpose.

CONCLUSION

The results obtained from the present study revealed that, the ethanol extracts of *Ipomoea obscura* (L.) showed the presence of most of the secondary metabolites in the plant leaves. The presence of functional groups and trace elements presents in the leaves of *Ipomoea obscura* (L.). The intensive study on the out - coming active constituents of *Ipomoea obscura* (L.) will lead to the discovery of a novel botanical - drug.

CONFLICT OF INTERESTS

Declared None.

ACKNOWLEDGEMENT

We, the authors are thankful to our Chancellor, Chief Executive officer, Vice-Chancellor and Registrar of Karpagam University for providing facilities and encouragement.

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