



Research Article

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Determination of Bioactive compounds in the leaf extract of *Phyllanthus niruri*, *Emblica officinalis* and *Psoralea corylifolia*

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ABSTRACT

A major part of the total populace relies upon the conventional plant based medicines. The study was carried out to determine the bioactive compounds in the botanicals viz., *Phyllanthus niruri*, *Emblica officinalis* and *Psoralea corylifolia* through phytochemical screening tests and to estimate the total phenol and flavonoid contents in three botanicals. The results of the phytochemical screening tests indicate the presence of phenols, tannin, flavonoids, saponins, terpenoids, steroids and alkaloids. Phytochemicals from medicinal plants/some botanicals are likely to possess many pharmacological activities such as antioxidant, anti-inflammatory, anti-cancer, antimicrobial effects against various pathogens. The Total Phenol content in *Phyllanthus niruri* is 115 mg/g and with flavonoid value 70.15 mg/g. The Flavonoid content in *Emblica officinalis* was found to be 22.52 mg/g. The value varies from plants to plants and the results clearly indicate that plants are rich in various phytochemicals components and it will be more advantage to use these botanicals as natural medicine compared with chemical drugs.

Keywords: Bioactive Compounds, Phenols Flavonoids, Terpenoids, Alkaloids, Steroids, Tannins, Saponins.

INTRODUCTION

Botanicals are rich in pharmaceutical values and are major sources of various types of medicines. Botanical are very much important and plays major role in controlling various disease causing pathogens [1]. and are helpful growth enhancers. Botanical extract have now evolved as a good route in medicine field and are rich in secondary metabolites which enhances growth, innate immune response and disease tolerant against pathogens in human as well as in various living organisms [2]. The botanicals are low cost, seen in huge quantity in our surroundings and they are safety to the living organisms, eco-friendly and widely useful for biological organisms.

The availability of biological active component from the plant based materials falls on the transfer process involving the liquid transport to the internal part of the plants (solid), the solubility of the solute and release of solutes from the solid matrix to the external bulk phase of the plant. The extraction of phenols can be said as the separation of medicinally important portion from plant tissues using selective solvents by various extraction procedures. Phenolic compounds are secondary metabolites that are produced in plants and are essential for plant growth [3]. Phenols plays major role in preventing chronic illness like cancers, cardiovascular problems, diabetes etc. Similarly, saponins are involved dietary food supplements and nutraceuticals [4]. Flavonoids are likely to possess many pharmacological activities such as antioxidant, anti-inflammatory, anti-cancer, antimicrobial effects against various pathogens.

Psoralea corylifolia is a medicinally important plant well recognized in Chinese and Indian folkloric medicine. The plant is of greater medicinal importance and it is actively used for various diseases and has critical effects several skin diseases like psoriasis, leucoderma and leprosy. It is described to contain essential oils and various secondary metabolites. It shows antitumor, anti-allergic, antioxidant, insecticidal and antimicrobial activity. Phytochemical screening tests were done for *Emblica officinalis* plant and reported the presence of tannins, flavonoids, phenolics, saponins, terpenoids, ascorbic acids, carbohydrates and many other phytochemicals [5]. The qualitative analysis of *P. niruri* leaf extract was made and reported the availability of phytochemicals like saponins, alkenes, phenolics, flavones and terpenes [6]. It is reported as phenols and flavonoids have significant antioxidant properties and has ability to inhibit the growth of microbial pathogens.

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This study clearly defines the various secondary metabolites such as phenols, tannin, flavonoids, saponins, terpenoids, steroids and alkaloids are present in the chloroform leaf extract of *Phyllanthus niruri*, *Emblica officinalis* and *Psoralea corylifolia*.

MATERIALS AND METHODS

Collection of plant materials and Extraction

The leaves of three botanicals viz., *Phyllanthus niruri*, *Emblica officinalis* and *Psoralea corylifolia* were collected from medicinal plants block of the field in the Sericulture department of Forest College and Research Institute, Mettupalayam, Coimbatore District. The collected leaves were shade dried, powdered and used for the study. Soxhlet apparatus was used for extraction purpose as procedure followed with slight modifications [7]. Chloroform was used as solvent for leaf extraction in this study.

Qualitative phytochemical analysis

The chloroform leaf extracts of *P. niruri*, *E. officinalis* and *P. corylifolia* were analyzed by the following procedures described by [8]. to test the presence of the phenols, flavonoids, tannins, alkaloids, saponins, terpenoids and steroids.

Alcohol of 2 ml and ferric chloride solution of 2-3 drops was added to 1 ml of crude extract, blue green or black coloration shows the presence of phenols. 2 ml crude extract was mixed with small quantity of concentrated HCl and magnesium was added drop wise. Formation of pink color after few minutes confirms the availability of flavonoids. 1 ml of distilled water and 2-3 drops of ferric chloride solution was added to 0.5 ml of crude extract. A black coloration indicated the presence of tannin. 2 ml of 1% HCl was mixed with crude extract and heated. After heating, Mayer's and Wagner's reagents were added to the mixture. If precipitate was observed in the reaction mixture it is confirmed the presence of alkaloids. 1 ml of crude extract was mixed with 5 ml of distilled water in a test tube and it was shaken. The formation of stable foam was taken as an indication for the availability of saponins. 2 ml of crude extract was mixed in chloroform of 2 ml and is dried. To this mixture, 2 ml of concentrated H₂SO₄ was added and heated for about 2 minutes. Presence of terpenoids was indicated by formation of greyish color at the interface. Dissolve 2 ml of the extract in chloroform and add equal volume of concentrated H₂SO₄. Formation of bluish red to cherry color in chloroform layer and green fluorescence in the acid layer shows the steroidal components in the extract.

Estimation of Total phenol content

The total soluble phenolic compounds in the chloroform leaf extract of *Phyllanthus niruri*, *Emblica officinalis* and *Psoralea corylifolia* is determined by using Folin-Ciocalteu reagent method [9]. 0.1 ml of the sample (1 gm of dry sample in 10 ml of acetone) in duplicate is incubated with 1 ml of diluted Folin-Ciocalteu reagent (1:2 with water) at room temperature for few minutes. 1ml of 7% sodium carbonate was added to the reaction mixture and it is incubated at room temperature for 1.5 hrs and the absorbance was read at 750 nm. The total phenol is expressed as gallic acid equivalent (GAE) in milligrams per gram of dry sample.

Estimation of Total flavonoid content

Total flavonoid contents of the chloroform leaf extracts of *Phyllanthus niruri*, *Emblica officinalis* and *Psoralea corylifolia* was determined based on the standard method [10]. Sample solution was prepared using 2 mg/ml of extract, diluted using ultrapure water. 0.1 ml of sample solution (2 mg/ml) was mixed with 0.1 ml of 2% Aluminium chloride (AlCl₃). Absorption was measured at a 425 nm wavelength after 30 minutes of reaction mixture is made. The quantity was calculated using quercetin calibration curve. The obtained results were mentioned as the Quercetin equivalent (QE) mg per gram of sample.

RESULTS AND DISCUSSION

Medicinal importance of the plants depends on the bioactive phytochemicals present in the plant parts which have definite physiological activity. The important phytochemical components such as phenols, alkaloids, tannins, essential oils, terpenoids, saponins and many more are useful for various medicinal importance [11]. In the present study, the phytochemical screening shows the presence/absence of phenols, flavonoids, alkaloids, terpenoids, steroids, saponins and tannins in the chloroform leaf extract of three botanicals viz., *P. niruri*, *E. officinalis* and *P. corylifolia* described in Table 1. respectively. It was revealed that aqueous and alcoholic extracts of *Psoralea corylifolia* leaves were analysed and indicated the presence of phenols, saponins, tannins, flavonoids, glycosides, carbohydrates, tannins, gums and mucilages, fixed oils and fats [12]. *P. corylifolia* leaves may be utilized for various medicinal activity and its pharmaceutical activity makes it a promising natural drug. It was reported that various secondary metabolites from the genus, *Psoralea* accounts to 129, which includes phenols, coumarins, flavonoids, benzofurans, quinines, benzopyrans, triterpenoids, steroids, and some other compounds [13].

Table 1: Phytochemical screening test for chloroform leaf extracts of *P. niruri*, *E. officinalis* and *P. corylifolia*

Plant constituents	<i>P. niruri</i>	<i>E. officinalis</i>	<i>P. corylifolia</i>
Phenols	+	+	+
Flavonoids	+	+	+
Steroids	-	-	+
Terpenoids	+	+	+
Alkaloids	+	+	+
Saponins	-	+	-
Tannins	+	+	+

(+) Presence; (-) absence of Phytochemicals

The results of the estimation of Total phenols and Total flavonoids values are expressed in mean ± standard deviation of three replications (n=3) described in Table 2. *P. niruri* shows the phenol content with value of 115.32 mg/g gallic acid equivalent (GAE) and the flavonoids with the value 70.15 mg QE/g dry extract respectively. Similarly, [14].

conducted an experiment and reported the total phenol content of *P. niruri* extract measured using GAE, QE and RE as standard and the extracts has values 61.36 ± 0.42 , 54.72 ± 0.39 and 424.29 ± 2.96 $\mu\text{g RE/mg extract}$.

Table 2: Estimation of Total Phenols and Total Flavonoids content in *P. niruri*, *E. officinalis* and *P. corylifolia*

S. No	Name of the Botanicals	Total Phenols (mg/g)	Total Flavonoids (mg/g)
1.	<i>Phyllanthus niruri</i>	115.32 ± 1.79^a	70.15 ± 0.70^a
2.	<i>Emblca officinalis</i>	80.65 ± 0.15^c	22.52 ± 0.01^c
3.	<i>Psoralea corylifolia</i>	92.14 ± 1.54^b	65.43 ± 1.00^b

The values are expressed in mean \pm standard deviation of three replications (n=3). Means followed by different small superscript letter in a column are significantly different at $p < 0.05$ %.

The total phenol and flavonoid content of the botanical *E. officinalis* showed 80.65 mg/g and 22.52 mg/g dry weight. The botanical *P. corylifolia* showed the phenol content with the value 92.14 mg/g and the flavonoids with the value 65.43 mg/g dry weight of the extract. Similar findings were reported by [15], where he evaluated the antioxidant properties of *Psoralea glandulosa* leaf, extracted with non-polar to polar solvents like hexane, dichloromethane, ethyl acetate and methanol where he estimated and reported that the leaf extract contains flavonoids (10.92, 37.49, 53.31, 55.34 mg QE/g dry extract) with different solvents respectively.

CONCLUSION

From this study, it is clearly seen that the botanicals can be used as natural medicine and the availability of various secondary metabolites from the botanicals is clearly mentioned and described. The availability of phenols and flavonoids in the botanicals is well understood for the disease resistance mechanism of plant based bioactive components. Hence, these botanicals can be used as natural/ indigenous drugs for various ailments.

Conflict of Interest

None declared.

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