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ORIGINAL ARTICLE

PHYTOCHEMICAL CONSTITUENTS OF DIABETIC CONTROL MEDICINAL PLANTS AT CUDDALORE DISTRICT, TAMIL NADU (INDIA)

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ABSTRACT

Diabetic controlling ten medicinal plants such as *Abutilum indicum, Aegle marmelos, Azadirachta india, Cocinia indica, Emblica officinalis, Eugenia jambolana, Gymnema sylvestre, Momordica charatia, Senna auriculata and Tinospora cordifolia* were investigated with phytochemical constituents. The phytochemical constituents of alkaloids, tannins , saponins, steroid, terpenoid, flavonoids, phlobatannin, polyphenols and cardic glycoside distribution in above medicinal plants belonging to different families were assessed and compared. All the plants were found to contain alkaloids, tannins, and flavonoids. The steroid and phlobatanin were absence in *Cocinia indica respectively*. The absence of saponin and steroid in *Emblica officinalis* respectively. The significance of the plants in traditional medicine and the importance of the antidiabetic activity of these chemical constituents were discussed with respect to the role of these plants in ethno medicine in Tamilnadu.

Keywords: Medicinal plants, Antidiabetic, Ethnomedicine, Phytochemical constituents.

1.INTRODUCTION

The developed nations are also looking for eco-friendly treatment of various diseases through plant based source (Vijayakumar *et al*., 2010). Plants have a limitless ability to synthesize aromatic substances mainly secondary metabolites, of which at least 12, 000 have been isolated, a number estimated to be less than 10% of the total (Mallikharjuna,*et al*. 2007). Traditional medicine like Orthodox medicine has its own methods and techniques of application, which however aims at healing disease (Wurochekke, et al., 2008). Many valuable herbal drugs have been discovered by knowing that particular plant was used by the ancient folk healers for the treatment of some kind of ailment (Ekka & Dixit, 2007). In this circumstance, diabetes mellitus is a global disease, found in all nations of the world with high prevalence rate. It is characterized by inability to regulate blood glucose caused by relative or absolute deficiency in insulin. The disease may occur as a result of pancreatic β-cells impairment, leading to reduction in insulin secretion. It could also occur when the insulin receptors are resistant to the functions of circulating insulin (Ada, 2010). Some of the medicinal plants are most important of these bioactive constituents of such as alkaloids, tannins, flavonoids, and phenolic compounds (Hill, 1952). In this study, most effective medicinal plants with anti diabetic activity, such as *Abutilum indicum, **Aegle marmelos, Azadirachta india,** Cocinia indica, **Emblica officinalis,** Euaenia iambolana. **Gvmnema sylvestre,** Momordica charatia, Senna auriculata and Tinospora cordifolia* were analyzed phytochemical constituents. This study use of defining and quantifying the percentage of crude phytochemical constituents present in these plants.

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2.MATERIALS AND METHODS

Collection and identification of plant materials

The leaves and stems of the plants were collected from uncultivated farmlands located at cuddalore district, Tamil Nadu (India). All the ten plant samples were identified by the authors. The voucher specimens were deposited in the government Arts College, PG and Research Department of Botany Chidambaram, Tamil Nadu. The plant samples were air-dried and ground into uniform powder using a Thomas- Willey milling machine. The aqueous extract of each sample was prepared by soaking 100 g of dried powdered samples in 200 ml of distilled water for 12 h. The extracts were filtered using Whatman filter paper No 42 (125 mm).

Phytochemical screening

Chemical tests were carried out on the aqueous extract and on the powdered specimens using standard procedures to identify the constituents as described by Sofowara (1993), Trease and Evans (1989) and Harborne (1973).

Test for tannins:

About 0.5 g of the dried powdered samples was boiled in 20 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for browrish green or a blue-black colouration.

Test for phlobatannins:

Deposition of a red precipitate when an aqueous extract of each plant sample was boiled with 1% aqueoushydrochloric acid was taken as evidence for the presence of phlobatinins.

Test for saponin:

About 2 g of the powdered sample was boiled in20 ml of distilled water in a water bath and filtered. 10ml of the filtrate was mixed with 5 ml of distilled water and shaken vigorously for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously, then observed for the formation of emulsion.

Teat for flavonoids:

Three methods were used to determine the presence of flavonoids in the plant sample (Sofowara, 1993; Harbrone, 1973). 5 ml of dilute ammonia solution were added to a portion of the aqueous filtrate of each plant extract followed by addition of concentrated H2S04. A yellow colouration observed in each extract indicated the presence of flavonoids. The yellow colouration disappeared on standing.

Few drops of 1% aluminium solution were added to a portion of each filtrate. A yellow colouration was observed indicating the presence of flavonoids.

A portion of the powdered plant sample was in each case heated with 10 ml of ethyl acetate over a steam bath for 3 min. The mixture was filtered and 4 ml of the filtrate was shaken with 1 ml of diluteammonia solution. A yellow colouration was observed indicating a positive test for flavonoids.

Test for steriods:

Two ml of acetic anhydride was added to 0.5 gethanolic extract of each sample with 2 ml H2S04. The colour changed from violet to blue or green in some samples indicating the presence of steroids.

Tannin determination by Van-Burden and Robinson (1981) method

500 mg of the sample was weighed into a 50 ml plastic bottle. 50 ml of distilled water was added and shaken for 1 h in a mechanical shaker. This was filtered into a 50 ml volumetric flask and made up to the mark. Then 5 ml of the filtered was pipetted out into a test tube and mixed with 2 ml of 0.1 M FeCl3 in 0.I N HCl and 0.008 M potassium ferrocyanide. The absorbance was measured at 120 nm within 10 min.

Saponin determination:

The method used was that of Obadoni and Ochuko (2001). The samples were ground and 20 g of each were put into a conical flask and 100 cm3 of 20% aqueous ethanol were added. The samples were heated over a hot water bath for 4h with continuous stirring at about 55ºC. The mixture was filtered and the residue re-extracted with another 200 ml 20% ethanol. The combined extracts were reduced to 40 ml over water bath at about 90ºC.

The concentrate was transferred into a 250 ml separatory funnel and 20 ml of diethyl ether was added and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded. The purification process was repeated. 60 ml of n-butanol was added. The combined n-butanol extracts were washed twice with 10 ml of 5% aqueous sodium chloride. The remaining solution was heated in a waterbath. After evaporation the samples were dried in the oven to a constant weight; the saponin content was calculated as percentage.

Flavonoid determination by the method of Bohm and Kocipai-Abyazan (1994):

10 g of the plant sample was extracted repeatedly with 100 ml of 80% aqueous methanol at room temperature. The whole solution was filtered through whatman filter paper No 42 (125 mm). The filtrate was later transferred into a crucible and evaporated into dryness over a water bath and weighed to a constant weight

3.RESULTS

The present study carried out on the plant samples revealed the presence of medicinally active constituents. The phytochemical characters of the six medicinal plants investigated were summarized in Tables 2 and 3. Alkaloids, tannins, flavonoids and cardiac glycosides were present in all the plants. Saponin was absent in E. *officinalis* and T. *cordifolia*. Steriod was absent in A.*indica,* E. *officinalis,* and E. *jambolana* respectively. Phlobatanin was absent in A. *marmelos,* C. *indica,* S. *auriculata* and T. *cordifolia* (Table 1). Quantitative estimation of the percentage crude chemical constituents in these medicinal plants studied is summarized in Table 2. S. auriculata contained the highest percentage crude yield of alkaloids (0.98 %), while A. indicum contained the lowest yield of alkaloid (0.36%). The highest yield of tannin (12.74%) in A.*marmelos*. Phenols were obtained in the plants but the yields recorded range between (0.45-0.03percent). Flavonoid recorded maximum of 0.98 % and saponin recorded 2.91% in maximum level.

4.DISCUSSION

Screening of Phytochemicals and their quantitative estimation of the % crude yield of phytochemical s of plant studied in Cuddalore district were rich in alkaloid steroid and some polyphenols (Table 2). Diabetes mellitus arise from the irreversible destruction of the pancreatic B.-cells causing deregulation and reduction of insulin secretion (Junod et al., 1969). Evaluation of hypoglycemic potentials of anti diabetic agent using alloxan induced hyperglycemia model has been described by Szkudelski, 2001. The hypoglycemic effect of this extract may be linked to its phytoconstituents especially flavonoids which act by potentiating the insulin effect either by increasing the pancreatic secretion of insulin by the cells of islet of langerhan or its release from bound insulin in alloxan induced diabetic rats. (Chakkravarthy, *et al*. 1980). They were known to show medicinally active molecules (Sofowara, 1993). G. *sylvestre* is a traditional medicinal plant has activity against diabetes mellitus. Some phytochemical compounds such as polysaccharides, terpenes and tannins, steroids, and alkaloids have been implicated in the antidiabetic activities of plants Tomoda *et al*. (1985); Reher *et al*. (1991) and Ivorra *et al*. (1989). Phytochemical study of the root extract revealed the presence of terpenes, saponins, tannins flavonoids and alkaloids (Antia and Okokon 2014). In the present study the ten plants such as *Abutilum indicum, **Aegle marmelos**, **Azadirachta india**, Cocinia indica, **Emblica officinalis**, Eugenia jambolana, **Gymnema sylvestre**, Momordica charatia, Senna auriculata and Tinospora cordifolia* were recorded high level of phytochemicals.

These plants might be responsible for anti diabetic activities. The present study showed the phytochemical potential of concluded that all medicinal plant tested in the cuddalore area were possessing medicinally active compounds and they are highly deserve for further study.

Table. 1. Quantitative analysis of the phytochemicals of the medicinal plants

Plants	Alkaloids	Tannin	Saponin	Steriod	Phlobatanin	polyphenols	Flavonoid	Cardic glycoside
A. *indicum*	+	+	+	+	+	+	+	+
A. *marmelos*	+	+	+	+	_	+	+	+
A. *india*	+	+	+	_	+	+	+	+
C. *indica*	+	+	+	_	_	+	+	+
E. *officinalis*	+	+	_	_	+	+	+	+
E. *jambolana*	+	+	_	_	+	+	+	+
G. *sylvestre*	+	+	+	+	+	+	+	+
M. *charatia*	+	+	+	+	+	+	+	+
S. *auriculata*	+	+	+	+	+	+	+	+
T. *cordifolia*	+	+	+	+	+	+	+	+

Table. 2. Percentage of crude alkaloids, phenols, tannin, flavonoids and saponin on the medicinal plants investigated

Plants	Alkaloids (%)	Phenols (%)	Tannin (%)	Flavonoid (%)	Saponin (%)
A. *indicum*	0.36 +0.1	0.19+0.12	12.38+0.10	0.40+0.18	1.98+0.10
A. *marmelos*	0.84+0.28	0.13+0.09	12.74+0.21	0.76+0.08	2.88+0.18
A. *india*	0.86+0.30	0.10+0.10	12.56+0.20	0.72+0.11	1.42+0.18
C. *indica*	0.74+0.20	0.03+0.11	7.22+0.24	0.78+0.11	1.23+0.01
E. *officinalis*	0.82+0.28	0.11+0.25	8.04+0.21	0.79+0.10	2.51+0.19
E. *jambolana*	0.68+0.20	0.12+0.23	8.25+0.22	0.78+0.02	1.62+0.01
G. *sylvestre*	0.88+0.31	0.15+0.14	9.36+0.23	0.96+0.12	2.85+0.25
M. *charatia*	0.87+0.35	0.25+0.12	8.45+0.45	0.98+0.23	2.91+0.26
S. *auriculata*	0.98+1.23	0.35+0.51	12.45+0.21	0.95+0.14	2.85+0.25
T. *cordifolia*	0.97+1.25	0.45+0.62	12.21+0.11	0.85+0.21	2.65+0.24

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