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Phytochemical Studies of *Dysophylla myosuroides* (Roth.) Benth. In. Wall. and *Talinum cuneifolium* (Vahl.) Willd

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ABSTRACT

Dysophylla myosuroides and *Talinum cuneifolium* are medicinal plants used for different diseases. The present work was aimed to screen these medicinal plants for phytochemical studies. The dry powder of plant parts were extracted with different solvents by using soxhlet apparatus. Leaves of *Dysophylla myosuroides* revealed the presence of flavonoids, phenols, glycosides, terpenoids, saponins, steroids and volatile oils and absence of alkaloids, lignin, tannins, quinones and fixed oils. Whereas, tubers and leaves of *Talinum cuneifolium* showed that the presence of flavonoids, glycosides, saponins and steroids and absence of alkaloids, phenols, lignin, tannins, terpenoids, quinones, fixed oils and volatile oils. Both the plants showed variation in the synthesis of secondary metabolites. *Dysophylla myosuroides* accumulates more number of secondary metabolites than that of *Talinum cuneifolium*. Methanol and hexane are found to be efficient solvents for *Talinum cuneifolium* and *Dysophylla myosuroides*, respectively. Tuber of *Talinum cuneifolium* synthesized more number of secondary metabolites than that of leaves, methanol the most efficient solvent to extract the phytochemicals from tuber and leaves of *Talinum*.

Key words: Secondary metabolites, phytochemical studies, *Dysophylla myosuroids*, *Talinum cuneifolium*, tuber, organic solvents

INTRODUCTION

Plant synthesizes a wide variety of chemical compounds which can be sorted by their chemical class, biosynthetic origin and functional groups into primary and secondary metabolites. Primary metabolites comprise sugars, amino acids, proteins and carbohydrates while secondary metabolites consist of alkaloids, flavonoids, saponins, tannins and steroids so on (Parekh and Chanda, 2007; Kumar *et al.*, 2009). Secondary metabolites do not seem to be vital to the immediate survival of the organism that produces them. These are not an essential part of the process of building and maintaining living cells. With the development of natural product chemistry, the potential of chemotaxonomy is now becoming increasing by obvious. The application of chemical data to systematic has received serious attention of a large number of biochemists and botanists during the last three decades (Sharanabasappa *et al.*, 2007).

Phytochemical constituents are the basic source for the establishment of several pharmaceutical industries. The constituents present in the plant play a significant role in the identification of crude drugs. Phytochemical screening is very important in identifying new sources of therapeutically and industrially important compounds like alkaloids, flavonoids, phenolic compounds, saponins, steroids, tannins, terpenoids etc. (Akindele and Adeyemi, 2007; Liu, 2003). Previously the crude drugs were

identified by comparison only with the standard descriptions available but recently due to advancement in the field of pharmacognosy various techniques have been following for the standardization of crude drugs (Savithramma *et al*., 2010).

Medicinal herbs have been use in one form or another under indigenous systems of medicine. Dubey *et al*. (2004) mentioned that the complete phytochemical investigations of medicinal plants of India should be carried out because these secondary metabolites are responsible for medical activity of the plant. Qualitative and quantitative phytochemical analysis was carried out in 53 plants of western region of India by Vaghasiya *et al*. (2011). Recent reports of the usefulness of phytochemicals for medicinal and therapeutic purposes and also taxonomic elucidation of plant species were studied by Ibrahim *et al*. (2007), Njoku and Akumefula (2007), Rasool *et al*. (2010), Jana and Shekhawat (2010), Karthishwaran *et al*. (2010), Oseni and Akindahunsi (2011), Ganesh and Vennila (2011) and Shafaei *et al*. (2011). Number of plants were screened for secondary metabolites for their medicinal values by Bhakuni *et al*. (2001) *Artemisia annua*, Rani and Naidu (1998) *Nardostachys jatamamsi*, Bazylko and Strzelecka (2007) *Thymus vulgaris*, Stajner *et al*. (2006) *Allium giganteum*, Bae *et al*. (2007) *Cephalotaxus koreana*, Savithramma *et al*. (2010) *Boswellia ovaliofoliolata*, Santhi *et al*. (2011) *Nerium oleander* and *Momordica charantia*, Nwokocha *et al*. (2011) *Jatropha* and Nawagish *et al*. (2007) *Lawsonia inermis*. Identification of biologically active compounds is an essential requirement for quality control and dose determination of plant based drugs. A medicinal herb can be viewed as a synthetic laboratory as it produces and contains a number of chemical compounds. The medicinal properties of plants can be determined by the presence of one or more plant natural products (Vinoth *et al*., 2011).

For the present study two species of medicinal plants were selected. *Dysophylla myosuroides* is common on open rocky crevices in hill slopes of Tirumala (Chetty *et al*., 2008). It is belongs to the family Lamiaceae, the local healers and tribals used to cure ailments and leaf extract is used for relieving anxiety and stimulation of brain (Savithramma, 2003). *Talinum cuneifolium* (Portulacaceae) is a green leaf vegetable, it is rich vitamin A and minerals content (National Institute of Science Communication, 2004). Indian System of Medicine (ISM) refers that the leaves and roots are medicinally important parts. The supplementation of the leaves are used in treatment of diabetic, mouth ulcer and aphrodisiac, roots are used for cough, gastritis, diarrhoea and pulmonary tuberculosis (Janapati *et al*., 2008). Several species of medicinal plants were screened for secondary metabolites, such studies are not performed so far in these plants though they are widely using for medicinal purpose. Hence in the present study these two taxa were selected for phytochemical screening.

MATERIALS AND METHODS

Leaves of *Dysophylla myosuroides* and leaves and tubers of *Talinum cuneifolium* collected from the Tirumala hills, Chittoor district Andhra Pradesh, India in December 2010. The leaves and tubers were air dried for 15 days and kept in the hot air oven at 60°C for 24 to 48 h and ground to fine powder. These powders extracted with different solvents by using soxhlet apparatus. The preliminary tests, for the detection of secondary metabolites were carried out with hexane, ethyl acetate and methanolic extracts. Soxhlated dry residue of extracts of 500 mg was dissolved in 100 mL of the respective solvents and filtered through Whatman No. 1 filter paper. Thus, the filtrates obtained were used as test solution for the following preliminary phytochemical studies.

The following methods are used to test the flavonoids (Peach and Tracey, 1956), steroids (Gibbs, 1974), terpenoids and tannins (Treare and Evans, 1985), glycosides (Kokate *et al.,* 1999), saponins and alkaloids (Gibbs, 1974), phenols (Gibbs, 1974) quinones and lignins (Gibbs, 1974) fixed oils and volatile oils.

RESULTS AND DISCUSSION

Preliminary phytochemical analysis of leaf extracts of *Dysophylla myosuroides* revealed that the pharmacological actions of crude drugs and other therapeutically active constituents were more in hexane extract which include flavonoids, phenols, steroids, glycosides and saponins. Ethyl acetate extract was rich in flavonoids, phenols, steroids, glycosides. The constituents which exhibited positive reaction in methanolic crude drug extract were phenols, saponins and steroids (Table 1).

Table 1: Preliminary screening of secondary metabolites from leaf extracts of *Dysophylla myosuroides,* tuber and leaf extracts of *Talinum cuneifolium*

Tests for secondary metabolites	*D. myosuroides* (Leaf)			*T. cuneifolium* (Tuber)			*T. cuneifolium* (Leaf)		
	Hexane	Ethyl acetate	Methanolic	Hexane	Ethyl acetate	Methanolic	Hexane	Ethyl acetate	Methanolic
Alkaloids									
Mayers	-	-	-	-	-	-	-	-	-
Wagners	-	-	-	-	-	-	-	-	-
Dragendorff's	-	-	-	-	-	-	-	-	-
Flavonoids									
$FeCl_3$	+	+	-	+	+	+	-	-	+
Shinoda's	+	+	-	+	+	+	-	-	+
Zin HCl reduction	+	+	-	+	+	+	-	-	+
Lead acetate	+	+	-	+	+	+	-	-	+
Phenols									
Phenol	+	+	+	-	-	-	-	-	-
Ellagic	+	+	+	-	-	-	-	-	-
Glycosides									
Kellar kilani	+	+	-	-	+	+	+	-	+
Lignin									
Labat	-	-	-	-	-	-	-	-	-
Lignin	-	-	-	-	-	-	-	-	-
Tannins									
Gelatin	-	-	-	-	-	-	-	-	-
$FeCl_3$	-	-	-	-	-	-	-	-	-
Lead acetate	-	-	-	-	-	-	-	-	-
Terpenoids	+	-	-						
Quinones	-	-	-	-	-	-	-	-	-
Saponins	+	-	+	-	-	+	-	-	+
Fixed Oils									
Filter paper	-	-	-	-	-	-	-	-	-
KOH	-	-	-	-	-	-	-	-	-
Steroids									
Slakowski	+	+	+	-	+	+	+	+	+
Libermann Burchard	+	+	+	-	+	+	+	+	+
Volatile oils	+	+	+	-	-	-	-	-	-

+: Presence, -: Absence

The test for the presence of terpenoids in fresh leaf material of *Dysophylla* revealed the presence of diterpenoids in it. Plant based drugs contain a mixture of multiple components which serve the effective control of diseases. Flavonoids are to be synthesized by plants in response to microbial infection. Flavonoids, tannins and terpenoids are attributed for analgesic and anti-inflammatory activities. Apart from this tannins contribute property of astringency i.e., faster the healing of wounds and inflamed mucous membrane (Okwu and Josiah, 2006).

Preliminary phytochemical analysis of all the tuber extracts of *Talinum cuneifolium*, revealed that the maximum number of the compounds were reported in methanolic extract which was rich in flavonoids, steroids, glycosides and saponins. Whereas, ethylacetate extract was rich in flavonoids, steroids and glycosides. Hexane extract showed positive results only for flavonoids. Steroids were found to be present in leaves and tuber of the selected plants. It should be noted that the steroidal compounds are of importance and interest in pharmacy due to their relationship with sex hormones (Santhi *et al*., 2011). The qualitative analysis of phytochemicals in the leaf crude extracts of *Talinum cuneifolium*, illustrates that methanolic extract which was rich in flavonoids, steroids, glycosides and saponins. Hexane extract rich in steroids and glycosides whereas steroids are present in ethyl acetate extract. Phenols are found in the leaves of *Dysophylla myosuroides* which are helpful to improve self immunity and important in pharmaceutical applications.

According to previous studies, roots of *Strychnons potatorum* (Mallikharjuna *et al*., 2007), leaves of *Bauhinia recemosa* (Sharanabasappa *et al*., 2007), methanolic extract of roots and leaves of *Hyptis suaveolens* (Nwobu *et al*., 2010), ethanolic extract of *Thymus fontanesii* and *Laurus nobilis* (Haddouchi *et al*., 2011) and *Rumex vesicarius* (Hariprasad and Ramakrishnan, 2011), aqueous extracts of *Echiumpynanthum pommel* (Chouche *et al*., 2011), *Cardiospermum halicacabum* (Patil *et al*., 2011), root tuber of *Curculigo* (Agrahari *et al*., 2010), leaves of *Nerium* and *Momordica* (Santhi *et al*., 2011), leaves, bark, root and galls of *Pistacia* (Uddin *et al*., 2011) and leaves, stem, roots and seeds of *Jatropha* (Nwokocha *et al*., 2011) rich in secondary metabolites.

In order to promote Indian herbal drugs, there is an urgent need to evaluate the therapeutic potentials of the drugs as per WHO guidelines (WHO, 2000). Patwardhan *et al*. (2004) mentioned that 30% of drugs selling in the world's market is based on natural products. Traditional indigenous medicine is limited to small tribal and geographical areas called "little traditions" are an excellent repository of knowledge about medicinal properties of botanical sources. Kamboj (2000) stated that the bioactive extract should be standardized on the basis of phytochemical compounds. Phytochemical screening of medicinal plants is very important in identifying new sources of therapeutically and industrially important compounds. It is imperative to initiate urgent steps for screening of plants for secondary metabolites. In the present communication an attempt has been made to assess the status of phytochemical properties in leaves and tuber of *Dysophylla myosuroides* and *Talinum cuneifolium* which will be beneficial in standardization of drug discovery and development. These two species are used by people extensively to improve the health status and also use in pharmaceutical and nutraceutical products of commercial importance.

CONCLUSION

Dysophylla myosuroides and *Talinum cuneifolium*, thus appear to be rich in secondary metabolites and widely used in traditional medicine to combat and cure various ailments. The anti-inflammatory, antispasmodic, antianalgesic and diuretic properties of these two plants can be attributed to their high flavonoids, steroids, glycosides and saponins. Exploitation of these

pharmacological properties involves further investigation of these active ingredients for the implementation techniques of extraction, purification, separation, crystallization and identification.

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