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Research Article

Qualitative analysis of phytochemicals and pharmacognostic evaluation of different extracts of *Acalypha fruticosa* leaves

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Abstract

Recently the traditional medicine is accepted as an alternative source for human health care and lead to the development of novel drugs from herbal plants. *Acalypha fruticosa* is the herbal plant commonly known as "Chinnichedi" and "Birch leaved acalypha" is a shrub belonging to the family of Euphorbiaceae. The objective of the study was to evaluate the pharmacognostic characters and qualitative phytochemical screening of different extracts of *A. fruticosa*. The qualitative phytochemical analysis and pharmacognostical evaluation was performed by standard procedure previously described with few modifications. The results of the qualitative phytochemical analysis and fluorescence analysis confirm that this plant is the plentiful source of phytoconstituents. The phytochemical analysis revealed the presence of flavonoids, proteins, phenols, carbohydrates, cardiac glycosides, fatty acids, phlobatannins and emodins. In conclusion, it was recommended that the plant *Acalypha fruticosa* can be used as promising source for the development of novel drugs due to the presence of various phytoconstituents.

Keywords: Phytochemical analysis, qualitative method, pharmacognosy, fluorescence, and *Acalypha frutiosa* leaves.

INTRODUCTION

The importance of medicinal plants has been realized and well documented by physician and scientists since ancient time. Majority of the population in developing countries depend on traditional system of medicine for their primary health care. Overharvesting of many traditional medicinal plants indirectly poses a risk to the society and has placed many medicinal species at risk of extinction. Commercial exploitation has also sometimes led to traditional medicines becoming unavailable to the indigenous peoples who have relied on them for centuries[1]. Indian Materia Medica includes about 2000 drugs of natural origin and most of them are derived from different traditional system and folklore practices [2].

Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables, roots and flowers that have defense mechanism and protect from various infections and insects. Phytochemicals are primary and secondary compounds. Chlorophyll, protein and common sugars are included in main

constituents and secondary compounds have terpenoid, alkaloid and phenolic compounds [3]. The species used for this work, *Acalypha fruticosa* an erect woody shrub, belongs to the family, *Euphorbiaceae* is one such folklore plant used in traditional system of medicine throughout Tamil Nadu, India. This plant is distributed up to 1800m above mean sea level in southern Western Ghats[4]. This plant species has been used as a folk medicine for the treatment of dyspepsia, skin complaints, jaundice, cholera, sexually transmitted diseases, stomach problems, antipyretic and even as an antidote [5]. The stem part of this species is used to cure wounds in animals and also used to treat toothache and the stem is used as fuel wood by tribal people. Despite these uses, no published works are available for this plant. The emergence and spread of antibiotic resistant microorganisms also triggered this type of plant investigations[6]. Higher plants can serve both as potential antimicrobial crude drugs as well as source of new anti-infective agents[7]. Hence we undertook the present study, an effort has been made to focus the plant in this angle and hence to assess its therapeutic potency. The objective of this research work is the screening of qualitative phytochemical analysis and pharmacognostical characters of *Acalypha fruticosa* leaves extracts.

Materials and Methods

Sample collection

The fresh plant leaves of *Acalypha fruticosa* was collected in the month of September - October in 2017 at the village of Thenkuchipalayam, Villupuram district, Tamil Nadu State, India. Then the leaves were washed under running tap water to remove the dust matters and unwanted contaminants. Then the leaves were shade dried and powdered using mechanical grinder. The fine powder was stored in airtight container.

Extract preparation

The extract was prepared by both hot and cold percolation methods. 20g of dried and powdered plant leaves was soaked in 100 ml of diethyl ether, petroleum ether, ethanol, methanol, and ethyl acetate respectively. Powdered with acetone and chloroform solvents were kept at room temperature by occasional shacking for 48hrs [8]. The water was boiled for over 1 hour at 100^0C. Then the extracts were filtered with Whatmann No.1 filter paper. Then the extract was stored in air tight container then refrigerated at 4^0C for further use.

Preliminary phytochemical studies

The individual extracts were subjected to different qualitative chemical investigation .The crude powder was extracted in different solvents are tested for various phytoconstituents present in them by standard procedure[9,10]. They are generally tested for the presence of alkaloids, flavonoids, tannins, phenols, cardiac glycosides, triterpenes, steroids and saponins[11].

Fluorescence analysis test

A small quantity of dried and finely powdered leaves sample was placed on a grease free microscopic slide and added 1-2 drops of freshly prepared solution, mixed by gentle tilting the slide and waited for 1-2 minutes. Then the slide was placed inside the UV viewer chamber and viewed in day light, short (254 nm) and long (365 nm) ultraviolet radiations. The colors observed by application of different reagents in various radiations were recorded [12,13].

Results

Powder characteristics

The dried and powdered leaf was greenish in color and has a distinctive taste in nature. The leaf powder has a very strong odor. When the powder was pressed between two filter papers by mechanically the greasy spot was noted. This indicates the presence of fatty acids. When the powder was mixed with water and shaken well, the development of well froth was noted for one minute. The result indicated the presence of saponins.

Phytochemical analysis result

The present study revealed the presence of phytochemicals as active medicinal chemical constituents (Table 1). Important medicinal phytochemicals such as flavonoids, carbohydrates, cardiac glycosides, proteins, xantho protein, phenols, fatty acids, phlobatannins and emodins were present in the samples. The result of the phytochemical analysis shows that the plant *Acalypha fruticosa* are rich in at least one of the flavonoids, protein, xantho protein, phenols, carbohydrates, cardiac glycosides, fatty acids, phlobatannins and emodins.

Fluorescence analysis of the powder

The powder was subject to fluorescence analysis as per the standard procedure. The changes in the color of *Acalypha fruticosa* leaf powder under UV radiation in reference to day light were observed with different chemical reagents (Table 2). This showed different colors of the powder in the presence or absence of chemical constituents. The fluorescence analysis of powdered drug plays a vital role in the determination of quality and purity of drug.

Table 1: Results of qualitative phytochemical analysis of *Acalypha fruticosa* leaf extracts

S. No	Name of the Compounds	Name of the Solvents				
		Diethyl ether	Ethanol	Ethyl acetate	Methanol	Petroleum ether
1	Alkaloids	-	++	++	+	+
2	Flavonoids	++	++	-	+	++
3	Carbohydrates	-	++	+	+	-
4	Glycosides	-	+++	+++	+++	++
5	Cardiac glycosides	-	+	+	+	-
6	Coumarins	+	+	-	-	+
7	Saponins	-	+	+	+	+
8	Hydroxy anthraquinones	-	++	-	+	-
9	Tannins	-	+	-	+	+
10	Phlobatannins	-	+	-	-	-
11	Proteins	++	++	+	+	++
12	Xantho protein	+	+	+	+	+
13	Amino acids	-	-	-	-	-
14	Steroids	-	+	-	-	-
15	Terpenoids	+	+	+	+	+
16	Phenols	-	++	+	+	+
17	Resins	-	+	+	+	+
18	Volatile oil	-	+	+	-	+
19	Fatty acid	-	-	+	+	-
20	Emodins	-	+	-	-	-

+ → present in small concentration; ++ → present in moderately high concentration; +++ → present in very high concentration; -- → absent

Table 2: Results of fluorescence analysis of *Acalypha fruticosa* leaf powder

S.No	Reagents	Day Light	Short UV (254 nm)	Long UV (365 nm)
1	Powder + 1M H_2SO_4	Yellow	Black	Black
2	Powder + 1M HCl	Yellow	Violet	Violet
3	Powder + 10% $CuSO_4$	Green	Violet	Violet
4	Powder + Con.HNO_3	Red	Violet	Violet
5	Powder + Dil.HNO_3	Greenish yellow	Black	Black
6	Powder + Con.HNO_3 + Dil.HNO_3	Reddish brown	Violet	Violet
7	Powder + 10% NaOH	Greenish yellow	Violet	Violet
8	Powder + 1% Glacial acetic acid	Greenish yellow	Violet	Violet
9	Powder + 1% Iodine	Greenish brown	Black	Black
10	Powder + Ethanol	Green	Red	Red

Discussion

Pharmacognostical and physicochemical studies, being reliable and inexpensive, play an important role in quality control issues of the crude drug samples[14]. Lack of standardization procedures fail to identify the drug from its originality which in that way exploits the handling of drug from its customary system of medicine. The plant *Acalypha fruticosa* is used from the ancient time for its great therapeutic values as a remedy in day to day life but in this aspect adulterations are also done which leads to its extinct. Most of the plants are eaten or used for their rich phytochemical constituents, which provide both preventive and curative properties to consumers against diseases most of which have had an age long existence. Scientists have great interest in the field of research of biologically active natural compounds for new sources of drugs, useful in controlling diseases.

In the present study the qualitative phytochemical screening discovered the presence of flavonoids, carbohydrates, cardiac glycosides, phlobatannins, proteins, xanthoproteins, terpenoids, fatty acids and emodins in the extracts of *Acalypha fruticosa* leaves. All the compounds listed above are already well known for their biological activity. Microbial and plant products occupy the major part of the biologically active compounds discovered until now[15]. The diethyl ether extract revealed the presence of flavonoids, coumarins, proteins, terpenoids and xanthoproteins. The ethanolic extract revealed the presence of alkaloids, flavonoids, carbohydrates, glycosides, hydroxyanthraquinones, proteins and phenols in moderately high concentration. Flavonoids belong to the group of polyphenolic compounds and are typically known for health promoting properties such as antioxidant, antiallergic, anti-inflammatory, antimicrobial and anticancer properties [16]. They exist widely in the plant kingdom and displayed positive correlation between increased consumption of flavonoids and reduced risk of cardiovascular and cancer diseases[17].

The ethyl acetate extract showed the presence of alkaloids and glycosides in high and moderately high concentration respectively and carbohydrates, proteins, xanthoproteins, terpenoids, phenols, resins and fatty acids in small concentration. Alkaloids have been reported to possess analgesic, antispasmodic and bactericidal, antimalarial and analgesic activities[18,19]. The methanol extract showed the presence of glycosides in high concentration and alkaloids, flavonoids, carhohydrates, saponins, hydroxyanthraquinones, terpenoids and phenols in small concentration. Terpenoids such as triterpenes, sesquiterpenes and diterpenes have been referred to as antibiotics, insecticidal, anthelmintic and antiseptic in pharmaceutical industry[20] .

Plants protect themselves against microbial pathogens by various defense responses including production of antimicrobial proteins which are small molecular mass antimicrobial peptides[21]. The petroleum ether extract showed the presence of flavonoids, glycosides and proteins in moderately high concentration. Based on the above mentioned results it was confirmed that the ethanolic extract of *Acalypha fruticosa* leaves having the wide variety of phytoconstituents.

Fluorescence is the phenomenon demonstrated by various chemical constituents present in the plant materials. Some components show fluorescence in the discernible range in daylight.

The ultra violet light produces fluorescence in several natural products (e.g. alkaloids like berberine), which do not noticeably fluoresce in daylight. If the substances themselves are not fluorescent, they may often be rehabilitated into fluorescent derivatives or decomposition products by applying diverse reagents. Therefore, some crude drugs are often assessed qualitatively in this technique and it is an imperative parameter of pharmacological evaluation[12,22]. As a result the process of standardization can be attained by stepwise pharmacognostic studies as stated above. These studies help in recognition and endorsement of the plant material. Such information can act as allusion information for correct identification of particular plant and also will be useful in conception a monograph of the plant. Further, it will act as a tool to identify adulterants and substituent and will help in maintaining the quality, reproducibility and effectiveness of natural drugs.

It confirms the medicinal value and hence the traditional usage of the study species, *A.fruticosa*

against various ailments. Further, these findings may lead support to the traditional use of *A. fruticosa* in the treatment of microbial infections. Further studies are suggested to purify the active compounds for the formulation of new drugs, while go for commercialization.

Conclusion

The phytochemical studies reported in the present study need further scientific investigation to ascertain its identity up to compound level. In conclusion, it was revealed that the plant *Acalypha fruticosa* was the plentiful source of phytoconstituents. More studies should be extended to this plant to identify more potent extracts in the development of novel drugs since plant derived substances are potential sources.

Reference:

1. Zschocke S, Rabe T, Taylor JLS, Jager AK, van Staden J. Plant part substitution - a way to conserve endangered medicinal plants. J Ethnopharmacol, 71(1-2): 2000; 281-92.
2. Narayana DBA, Katayar CK, Brindavanam NB. Original system: search, research or research. IDMA Bull 1998; 29:413-6.
3. Krishnaiah D, Sarbatly R and Bono A. Phytochemical antioxidants for health and medicine: A move towards nature. Biotech Mol Biol Rev 1; 2007: 97-104.
4. Gamble JS and Fischer C, The flora of Presidency of Madras. Bishen Singh Mahendra Pal Singh, Dehradun, 3; 1958: 1329 – 1331.
5. Anandakumar AM, Paulsamy S, Sathishkumar P, and Senthilkumar P. Preliminary phytochemical studies for the quantification of secondary metabolites of medicinal importance in the plant, Acalypha fruticosa Forssk. J Appl Nat Sci. 2009; (11): 41 – 43.
6. Cowan MM, Plant products as antimicrobial agents. Clin Microbiol Rev; 12; 1999: 564 – 582.
7. Rios JL and Reico MC. Medicinal plants and antimicrobial activity. J Ethnopharmacol; 100; 2005: 80 – 84.
8. Sharmistha Chakravarthy and Chandra Kalita Jogen. Preliminary phytochemical screening and acute oral toxicity study of the flower of Phylgacanthus hyrsiflorus Nees in albino mice. Int Res J Pharm, 3; 2012: 293- 295.
9. Harborne JB, Phytochemical methods. Edn 2. London: Chapman & Hall.
10. Kokate CK. Practical Pharmacognosy, Edn 4, Vallabh Prakashan, Delhi; 1997: 107-111.
11. Upadhya V, Pai SR, Ankad G, Hurkadale PJ, Hegde HV. Phenolic contents and antioxidant properties from aerial parts of Achyranthes coynei Sant. Indian J Pharm Sci, 75: 2013; 483-6.
12. Gupta MK, Sharma PK, Ansari SH and Lagarkha R. Pharmacognostical evaluation of Grewia asiatica fruits. Int J Plant Science; 1(2); 2006: 249-251.
13. Kokashi CJ, Kokashi RJ and Sharma M. Fluorescence of powdered vegetable drugs in ultraviolet radiation. J American Pharm Assoc; 47; 1958: 715-717.
14. Bigoniya P, Singh CS, Srivastava B. Pharmacognostical and physico-chemical standardization of Syzigium cumini and Azadirachta indica seed. Asian Pac J Trop Biomed 2012:S290-5.
15. Berdy J, Bioactive microbial metabolites, J.Antibiot. 2005;(58): 1–26.
16. Aiyelaagbe, OO and Osamudiamen, PM. Phytochemical screening for active compounds in Mangifera indica. Plant. Sci. Res., 2. 2009; 11–13.
17. Yang, C.S., Landau, J.M., Huang, M. and Newmark, H.L. Inhibition of carcinogenesis by dietary polyphenolic compounds. Ann. Rev. Nut., 21. 2001; 381–406.
18. Okwu, D.E. and Okwu, M.E. Chemical composition of Spondias mombia Linn plant parts. J. Sustain. Agric. Ecosys. Environ., 6. 2004; 140–147.
19. Oomah, D.B. Isolation, characterization and assessment of secondary metabolites from plants for use in human health. PBI Bull., 2003; 13–20.
20. 20. Parveen, M., Ghalib, R.M., Khanam, Z., Mehdi, S.H. and Ali, M. A novel antimicrobial agent from the leaves of Peltophorum vogelianum (Benth.). Nat. Prod. Res., 24. 2010; 1268–1273.
21. 21. Walter, A. Plant defense mechanisms are activated during biotrophic and necrotrophic

development of Colletotricum graminicola in Maize. Plant. Physiol., 158. 2012; 1342–1358.

22. 22. Ansari SH. Essentials of Pharmacognosy. Birla Publications Pvt. Ltd 1st edition, 2006. New Delhi.