Research Article

PRELIMINARY PHYTOCHEMICAL SCREENING AND PHYSICOCHEMICAL CHARACTERIZATION OF *CANNA INDICA* L

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Accepted on: 12-04-2012; **Finalized on:** 25-05-2012.

ABSTRACT

The study has been designed with the objective to examine the preparation of different extracts by successive solvent extraction for detailed analysis. Different physicochemical parameters such as loss on drying, pH value, ash value, extractive value were determined. Qualitative phytochemical analysis of *Canna indica* L. flower confirm the presence of various phytochemicals such as Alkaloids, Carbohydrates, Proteins, Flavonoids, Terpenoids, Cardiac Glycosides, Steroids, Tannins, Saponins, Phlobatinins. Fluorescence analysis of different successive extracts and powder were noted under UV light and normal ordinary light, which significance there characteristics.

Keywords: *Canna Indica* L., Physicochemical, Phytochemical, Successive Solvent Extraction, Fluorescence Analysis.

INTRODUCTION

Plants are now occupying important position in allopathic medicine, herbal medicine, homeopathy and aromatherapy. Medicinal plants are the sources of many important drugs of the modern world. Many of these indigenous medicinal plants are used as spices and food plants; they are also sometimes added to foods meant for pregnant mothers for medicinal purposes.[1] Many plants are cheaper and more accessible to most people especially in the developing countries than orthodox medicine and there is lower incidence of adverse effects after use. These reasons might account for their worldwide attention and use.[2]

Secondary metabolites are organic compounds that are not directly involved in the normal growth, development or reproduction of an organism. Unlike primary metabolites, absence of secondary metabolites does not result in immediate death, but rather in long-term impairment of the organism's survivability, fecundity, or aesthetics, or perhaps in no significant change at all. Secondary metabolites are often restricted to a narrow set of species within a phylogenetic group. Secondary metabolites often play an important role in plant defense against herbivory and other interspecies defenses. Humans use secondary metabolites as medicines, flavorings and recreational drugs.

Canna indica is a perennial growing to 1.5 m (5ft) by 0.6 m (2ft). It is hardy to zone 8 and is frost tender. It is in flower from August to October and the seeds ripen in October. The flowers are hermaphrodite (have both male and female organs). The plant prefers light (sandy), medium (loamy) and heavy (clay) soils and requires well-drained soil. The plant prefers acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It requires moist soil.

The plant is used in the treatment of women's complaints. A decoction of the root with fermented rice is used in the treatment of gonorrhoea and amenorrhoea. The plant is also considered to be demulcent, diaphoretic and diuretic.

MATERIALS AND METHODS

Sample Collection

The Plant species namely *Canna indica* L. flower were collected in Padappaikkadu and around Thanjavur (Dt), Tamil Nadu. The collected samples were carefully stored in polythene bags and used for the present study.

Sterilization of Plant Materials

The disease free and fresh plants were selected for this investigation. About 2gm fresh and healthy flowers were taken for various solvent such as Ethanol, Methanol and Distilled Water. Then, surface sterilized with 0.1% mercuric chloride and alcohol from few seconds. Again the plant materials were washed thoroughly with distilled water (Three times).

Preparation of Flower Extracts

2 grams of sterilized flower were kept in the 10 ml organic solvents such as ethanol, methanol and distilled water. Then these are grind with the help of mortar and pestle. The grind plant material was subjected to centrifugation, for 10-15min (at 10,000 rpm). The supernatant was collected and stored for further purposes.

Preparation of *Canna indica* L. flower Powder[3]

10 grams of sterilized flower were kept in the sterilized plate. The flowers were air dried under shade for 10-15 days. Then the dried material was grinded to fine powder using an electric grinder and stored in air tight bottles. The powder mater was used further, phytochemical screening.

Screening of Preliminary phytochemicals

Test for Carbohydrates

To 2ml of extract 2 drops of Molisch's reagent was added and shaken well 2ml of concentrated H_2SO_4 was added on the sides of the test tube. A reddish violet ring appeared at the junction of two layers immediately indicated the presence of carbohydrates.

Test for Cholesterol

To 2ml of the extract 2ml of the chloroform was added in a dry test tube then 10 drop of acetic anhydride and 2 to 3 drops of concentrated H_2SO_4 was added. A red rose colour changed to blue green colour.

Test for Proteins

To 2ml of protein solution 1ml of 40% NaOH solution and 1 to 2 drops of 1% $CuSO_4$ solution was added. A violet colour indicated the presence of peptide linkage of the molecule.

Test for Amino Acids

To 2ml of sample added 2ml of Ninhydrin reagent and kept in water bath for 20 minutes. Appearance of purple color indicated the presence of aminoacids the sample.

Test for Alkaloids

To the extract added 1% HCl and 6 drops of Mayer's regent and Dragendroff's reagent. An organic precipitate indicated the presence of alkaloids in the sample.

Test for Flavonoids

5ml of dilute ammonia solution were added to a portion of aqueous filtrate of plant extract followed by addition of concentrated H_2SO_4. A yellow coloration is observed which confirms the presence of flavonoids and it disappears on standing.

Test for Terpenoids

5ml of extract was treated with 2ml of chloroform and 3ml of concentrated H_2SO_4 to from a monolayer of reddish brown coloration of the interface was showed to from positive result for the terpenoids.

Test for Cardiac Glycosides

5ml of extract was treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution this was under layered with 1ml of concentrated H_2SO_4. Brown rings of the interface indicate a deoxy sugar characteristic of cardenolides. A violet ring might appear below the brown ring whereas the acetic acid layer, a greenish ring might form just gradually throughout thin layer.

Test for Steroids

2 ml of acetic anhydride was added to 0.5g of ethanolic extract of sample with 2 ml of H_2SO_4. The colour change from violet to blue or green indicated the presence of steroids.

Test for Tannins

5ml of extract was added to few drops of 1% lead acetate. A yellow precipitate indicated the presence of tannins.

Test for Saponins

The extract with 20 ml of distilled water was agitated in a graduated cylinder for 15 minutes. The formation of 1 cm layer of form indicated the presence of Saponins.

Test for Phlobatinins

Aqueous extract of plant sample were boiled with 1% aqueous HCl, red precipitate was deposited which was taken as evidence for the presence of phlobatinins.

RESULTS AND DISCUSSION

Phytochemical screening of *Canna indica* L. flower

The present study carried out the *Canna indica* L. flower sample revealed the presence of medicinally active metabolites. The phytochemical character of the *Canna indica* flower investigated is summarized in the table 1**.** The phytochemical evaluation of the flower extract was done for the presence of Alkaloids, Glycosides, Saponins, Terpene, Carbohydrate, Steroid, Protein, Cholesterol, Flavonoid, Phylobatinin, and Tannin. Aminoacids were absent in *Canna indica* flower.

Table 1: Screening of Preliminary Phytochemicals of *Canna indica* L. flower

S.No	Name of the test	Result
1.	Alkaloids	+
2.	Amino acids	-
3.	Carbohydrates	+
4.	Cholesterols	+
5.	Flavonoids	+
6.	Glycosides	+
7.	Phlobatinins	+
8.	Proteins	+
9.	Saponins	+
10.	Steroids	+
11.	Terpenoids	+

(+) = indicate presence (-) = indicate absence

Akrout (2010) reported that phytochemical constituents of plants is desirable, not only for the discovery of therapeutic agents, but also because such information may be of value in disclosing new sources of such economic materials as tannins, oils, gums, flavonoids, saponins, essential oils precursors for the synthesis of complex chemical substances.[4]

In previous investigation, the curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites such as alkaloids, flavonoids, glycosides, phenols, saponins, sterols etc. The above results indicates that, the leaves of the plants investigated are rich in alkaloids, flavonoids, reducing sugars, phenols and also showed presence of aminoacids. They are known to show medicinal potential and physiological activities.[2]

Physicochemical characters

Ash usually represents the inorganic part of plant dried flower powder of *Canna indica* L. was studied for parameters like pH value (Ethanol, Methanol and Water), loss of weight on drying, total ash, water insoluble ash, Acid insoluble ash, water soluble extract and alcohol soluble extractive contents were found to be 8.0, 4.0 and 6.0, 4.1.%, 17.98%, 48%, 69.2%, 3.86% and 6.315% respectively results revealed that acid insoluble ash had maximum percentage (w/w) and alcohol soluble extractive had minimum percentage (w/w). The results are tabulated in table 2(a). The phyto – profiling for the flowers extracts of *Canna indica* L. were tabulated in table 2(b). The fluorescence analysis of powder and flower extracts of *Canna indica* L. were tabulated in the table 3(a) and 3(b).

Table 2(a): Physicochemical characters of *Canna indica* L. flower

Parameters tested	Percentage Yield (%)
pH value	
Ethanol	8.0
Methanol	4.0
Water	6.0
Loss Of Wt On Drying	4.1
Total Ash	17.98
Acid Insoluble Ash	69.2
Water Insoluble Ash	48
Extractive Value	
Alcohol Soluble Extractive	3.86
Water Soluble Extractive	6.31

Table 2(b): Preliminary phyto – profile for flower of *Canna indica* L.

Solvent used	Colours	Consistency
Petroleum ether (40 – 60°C)	Light yellow	Non sticky
Benzene	Yellow	Non sticky
Chloroform	Yellow	Sticky
Acetone	Brownish yellow	Non sticky
Methanol	Pale yellow	Non sticky
Ethanol	Brown	Non sticky
Water	Light Brown	Non sticky

The extractive values are useful to evaluate the chemical constituents present in the crude drug and also help in estimation of specific constituents soluble in a particular solvent in these investigation water – soluble and alcohol soluble extractive values decreased with maturity of *Averrhoa carambola* L. fruit.[5]

The determination of ash value was carried out which gives an idea of the earthy matter or the inorganic composition and other impurities present along with the drug. The percentage of total ash, acid insoluble ash sulphated ash and water soluble ash are carried out and extractive values were also determined which are primarily useful for the determination of exhausted or adulterated drugs extractive values were also determined. The loss on drying at 105°C in leaf was found to be 5.9% the water soluble extractive value was indicating the presence of sugar acids and inorganic compounds and the alcohol soluble extractive values indicate the presence of sugar, acids and inorganic compounds and the alcohol soluble extractive values indicate the presence of polar constituents like phenols steroids, glycosides and flavonoids.[6]

Table 3 (a): Fluorescence analysis of powder of *Canna indica* L. flower

Particulars of the treatment	Under Ordinary Light	Under UV Light
Powder as such	Brownish yellow	Reddish yellow
Powder +1N NaOH (aqueous)	Brown	Red
Powder+1N NaOH (alcoholic)	Reddish yellow	Yellow
Powder + 1N Hcl	Pink	Cherry red
Powder + H_2SO_4 (1:1)	Orange	Greenish yellow
Powder + HNO_3 (1:1)	Pale yellow	Yellow
Powder + Ammonia	Pale yellow	Brick red
Powder + Iodine	Reddish Brown	Cherry red
Powder + 5%$FeCl_3$	Light green	Yellowish green
Powder +Acetic Acid	Brick red	Red

Table 3 (b): Fluorescence characteristic of flower extract of *Canna indica* L

Extract	Under Ordinary light	Under UV light (366 nm)
Petroleum ether (40– 60°C)	Light yellow	Green
Benzene	Yellow	Green
Chloroform	Yellow	Purple Yellow
Acetone	Brownish yellow	Cherry Red
Methanol	Pale yellow	Light Green
Water	Light Brown	Purple

The preliminary phyto – profiling for the leaves extracts of *Catunaregum spinosa* was carried out wherein the consistency was found to be sticky in the non polar to not so polar solvent extracts where as the polar solvent extracts were found to be non – sticky. The percentage yield w/w of the extracts was also analysed wherein the highest yield was found to be in the ethanol extract – 8.05%.

Fluorescence analysis of powders and crude extracts of different parts of medicinal plants (leaf, stem, root, bark and fruit) gives a clue if powder and extracts are in adulteration, thus can be used as a diagnostic tool for testing the adulteration. Such studies were done previously in *Morinda tinctoria* and *Abutilon indicum*.[7]

CONCLUSION

The present study preliminary phytochemical and physicochemical evaluation of *Canna indica* L. flower could be used as the diagnostic tool for the standardization of medicinal plant. It can be considered as the identifying parameters to substantiate and authenticate the drug.

Acknowledgement: First of all I thank the almighty that give this good opportunity and he gave us strength to finish this project work successfully. I express my sincere thanks to **Dr. V. Dhivakaran, M.sc., D.E.M., Ph.d.,** Correspondent, S.T.E.T. Women's College, Mannargudi for providing needful sophisticated facilities.

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