Biosciences, Biotechnology Research Asia Vol. **7**(2), 957-961 (2010)

Proximate analysis and quantification of steam volatiles, acid, phenol, base and neutral components from the leaves and stem of *Ipomoea carnea*

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(Received: May 25, 2010; Accepted: July 08, 2010)

ABSTRACT

Herbal drugs are used for the treatment of various diseases as described in ayurvedic system of medicine. Various parts of the plants are used for various diseases. Herbal medicines are the base of many of the pharmaceuticals we used today. Various extracts of the materials were used for the qualitative phytochemical analysis for the detection of alkaloid, flavonoid, steroid, starch, tannin etc. leaves and stem both contains the same phytochemical constituents in different proportions. Quantitative estimation of steam volatiles, acid, phenol, base and neutral constituents along with other phytochemicals were performed from ethanol extract of both parts of the plant. All were the mixtures of the components determined by performing TLC in suitable solvent systems. Leaves material contains more components than stem material.

Key words: *Ipomoea carnea*, steam volatiles, phytochemical test, acid, phenol, base, neutral.

INTRODUCTION

A knowledge of the chemical 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, precursors for the synthesis of complex chemical substances, etc. In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies[1].

Several phytochemical surveys have been published, including the random sampling approach which involved some plant accessions collected from all parts of the world. The major chemical substances of interest in these surveys have been the alkaloids and steroidal sapogenins (saponins), however, other diverse groups of naturally occurring phytochemicals such as flavonoids, tannins, unsaturated sterols, triterpenoids, essential oils, etc. have also been reported[2].

In recent years, secondary plant metabolites (phytochemicals), previously with unknown pharmacological activities, have been extensively investigated as a source of medicinal agents[3]. Thus, it is anticipated that phytochemicals with adequate antibacterial efficacy will be used for the treatment of bacterial infections[4]. Since time immemorial, man has used various parts of plants in the treatment and prevention of various ailments[5].

In the convolvulaceae family, the Ipomoea species are cultivated and found in all regions of the world.[6] Many Ipomoea species have very high medicinal value as those are used in Ayurvedic systems of medicine, for example *I. batata, Marginata,digitata etc.* have very high medicinal value[7].

One of the species is *Ipomoea Carnea.* It is commonly called as Mahananda in Marathi. It is native of South America. It is available in all states of India due to its adaptation to the Indian climatic conditions.[8] *I. Carnea* is an exotic weed in Chattisghara, India and only few decades back it was introduced as Green Manure Crop.[9] An evaluation of immunomodulatory activity of *Ipomoea carnea* on peritoneal cells of rats was studied.[10] An approach involved the collection, identification, extraction and phytochemical evaluation of extracts.

MATERIAL AND METHODS

Plant Material

The plant, *Ipomoea carnea* was collected from river side of Pune, Maharashtra, India. It was authenticated by comparing herbarium voucher specimen deposited at Botanical Survey of India, India, Pune. Its authentication number is E LICAI BSI/WC/Tech/2009/96.

Preparation of leaves and stem extracts

Air shade dried and powdered plant material of leaves and stem (10 g) was extracted with solvents (50 ml each) of increasing polarity from non polar (n-hexane), semi-polar (chloroform, ethyl acetate, acetone) and the polar (ethanol, methanol, water) by keeping for 24 hours at room temperature. Solvent was recovered under reduced pressure to obtain crude extracts.[11]

Quantitative estimation of volatile matter

Loss on drying experiment was carried out to achieve exact percentage of volatile matter by performing moisture content using Karl-fischer method for air shade dried powdered material. Results are mentioned in Table 1.

Quantitative evaluation of extractive values

The various extracts obtained from the cold and hot solvents, kept in contact for 24 hours at room temperature and 24 hours under refluxed conditions. Solvents were removed under reduced pressure and the extracts were weighed to find out extractive value of each. Results are reported in Table 2.

Quantitative determination of steam volatile matter

The aroma, the odorous volatile principles, are the essential oils of the plant. To acquire the steam volatile, steam was passed through the material. The steam volatile matter was extracted with solvent ether. Removal of ether furnished steam volatile matter. TLC was performed and it indicated that it was a mixture of compounds. (Table 3)

Phytochemical Analysis

All extracts were analyzed for the phytochemical composition, secondary metabolites by qualitative methods. The results are mentioned in Table 5 and 6.

Test for alkaloids

A portion of the extract solution was treated with few drops of picric acid, development of yellow precipitate indicated the presence of alkaloids.

Test for Tannins

Ferric chloride test was used to detect the presence of tannins. Extract was taken in a test tube and few drops of ferric chloride was added. Developmemt of greenish yellow colour indicated the presence of tannins.

Test for Steroids

To a test solution of extract acetic acid was added, formation of green colour indicated the presence of steroids.

Test for protein

To a test solution of extract concentrated nitric acid was added, development of orange colour indicated the presence of protein.

Test for Starch

Extract was mixed with concentrated sulphuric acid.Development of brown colour indicated the presence of starch.

Test for sugars

To a test solution of extract Benedict solution was added, formation of green colour indicated the presence of sugar.

Test for flavonoids

To a test solution of extract concentrated sulphuric acid was added, development of yellow-orange colour indicated the presence of flavonoids.

Estimation of acid, phenol, base and neutral components

Air shade dried powdered leaves and stem material (30 g each) of *Ipomoea carnea* were refluxed with 250 ml ethanol for 24 hours. A gummy mass of each was obtained on removal of solvent under reduced pressure. This gummy mass was tested for quantitative estimation of total acidic, phenolic, basic, and neutral components. The yield of ethanol extract for leaves and stem was 17% and 15% respectively.

The extract was tested for quantitative determination of acidic, phenolic, basic and neutral components by standard procedures. (Table 4)

RESULTS

Leaves material contains more volatile matter than stem (Table 1). Percentage extractive values of leaves and stem using cold and hot solvents are reported in Table 2. Plant materials contains more polar components as aqueous extracts of leaves and stem shows comparable values as 18.0 and 17.8 % respectively. Ethyl acetate and methanol extracts were found to be 7.7%, 8.0% for leaves and 7.4%, 8.0% for stem respectively.

Table 1: Volatile matters of *Ipomoea carnea* leaves and stem

Sample	Moisture content (%)	Total volatile matter (%)	Volatile matter (%)
Leaves	4.63	7.48	2.85
stem	4.34	7.40	3.16

Table 2: Cold and Hot solvent extractive values

Solvents	Cold solvent of leaves(%)	Hot solvent of leaves(%)	Cold solvent of stem (%)	Hot solvent of stem(%)
n- Hexane	2.2	3.1	2.1	2.9
Chloroform	1.4	1.9	1.3	2.1
Ethyl acetate	9.5	10.4	9.4	10.1
Acetone	7.7	8.1	7.4	7.9
Ethanol	7.8	8.3	7.5	8.0
Methanol	8.0	9.0	8.0	8.9
Water	18.0	18.8	17.8	18.1

Table 3: Steam volatiles

Material	Steam volatile (%)	No. of major components
Leaves	6.7	5
Stem	6.4	5

Table 4: Quantitative yield of acid, phenol, base and neutral components

Components	Yield (%) stem	Yield (%) leaves
Acid	3.35	3.87
Base	0.60	1.4
Phenol	0.60	1.2
Neutral	26.80	30.40

Steam volatile matter is 6.7 % and 6.4 % present in leaves and stem materials respectively.(Table 3)

Ethanol extract is tested for quantitative determination of acid, phenol, base and neutral for both materials. Neutral components are noticed in higher percentage (30.40 and 26.80) in leaves and stem respectively. Acidic matter is present 3.87, 3.35 and phenolics are depicted 1.2, 0.60 % for leaves and stem respectively (Table 4).

Table 5: Phytochemicals of cold solvent extraction of *I. carnea* leaves

Solvents	Major components by TLC	Phytochemicals
n- Hexane	4	Starch , protiens
Chloroform	5	Starch, sugars, alkaloids & flavonoids
Ethyl acetate	6	Starch , sugars & alkaloids.
Acetone	5	Starch , tannins, steroids & sugars
Ethanol	7	Alkaloids, tannins, steroids, sugars & flavonoids
Methanol	8	Alkaloids, tannins, steroids, sugars & flavonoids
Water	8	Alkaloids, tannins, steroids, sugars & flavonoids

Table 5: Phytochemicals of cold solvent extraction of *I. carnea* stem

Solvents	Major components by TLC	Phytochemicals
n- Hexane	3	Starch and proteins
Chloroform	5	Alkaloids, steroids, Starch & flavonoids
Ethyl acetate	6	Steroids & flavonoids
Acetone	6	Starch , tannins, steroids & sugars
Ethanol	7	Alkaloids, tannins, steroids, sugars & flavonoids
Methanol	8	Alkaloids, tannins, steroids, sugars & flavonoids
Water	8	Alkaloids, tannins, steroids, sugars & flavonoids

Results of phytochemical tests of leaves and stem extracts obtained in different solvents are displayed in Table 5 and 6. n- Hexane extract shows presence of starch and protein in both materials. Ethyl acetate and chloroform extracts of leaves and chloroform extract of stem exhibite presence of sugars, alkaloids and flavonoids. Ethyl acetate extract of stem reveals presence of steroids and flavonoids. Acetone extract of leaves and stem demonstrates the presence of starch, tannins, steroids and sugars. Ethanol, methanol and water extracts of leaves and stem illustrate positive tests for alkaloids, tannins, steroids, sugars and flavonoids.

DISCUSSIUON

Phytochemical screening of the various extracts of plant reveal that the plant contain several secondary metabolites. Steam volatile contains more percentage of mixture in leaves material than stem material. Low percentage of steam volatile of stem sample reveals a mixture of major eight components is detected by Gas Chromatography. In contrast leaves material furnishes high percentage of steam volatiles that was composed of five components as shown by Gas Chromatography. Same conclusions were made for total volatiles present.

Cold and hot solvent extractive values for both materials are similar. The presence of polar components are more as depicted higher percentage in aqueous extract. Ethyl acetate extract in both materials show most strikingly higher percentage of extractive value, next to it methanol, ethanol and acetone values are noticed. All extracts are the mixtures of components as ascertain by TLC.

Quantification of acidic, phenolics, basic and neutral components show that both materials are composed of neutral components in major amounts.

REFERENCES

1. Farnsworth N R. Biological and phytochemical screening of plants. *J. Pharm. Sci*., **55**: 225-276 (1966).
2. Farnsworth N R, Henry L K, Svoboda G H, Blomster R N, Yates M J and Euler K L. Biological and phytochemical evaluation of plants. I. biological test procedures and results from two hundred accessions. *Lloydia,* **29**: 01-122 (1966).
3. Krishnaraju AV, Rao TVN, Sundararaju D *et al*. Assessment of bioactivity of Indian medicinal plants using Brine shrimp (Artemia salina) lethality assay. *Int J Appl Sci* Eng **2**: 125-134 (2005).
4. Balandrin MF, Kjocke AJ, Wurtele E *et al*. Natural plant chemicals: sources of industrial and mechanical materials. *Science*, **228**: 1154-1160 (1985).
5. Tanaka H, Sato M, Fujiwara S. Antibacterial activity of isoflavonoids isolated from Erythrina variegata against methicillinresistant Staphylococcus aureus. *Lett Appl Microbiol,* **35**: 494-498 (2002).
6. Schwarz, Aline; Hosomi, Rosana Zoriki; Henrique, Breno Schumaher; Huaza, Isis; Gardner, Ddale; Haraguchi, Mitsue; Gorniak, Silvana Lima; Bernardi, Maria Maratha; Spinosa, Helenice de Souza. *Revista Brasileira de Ciencias Farmaceuticas,* **40**(2): 181- 187 (2004).
7. V. V. Shivrajan, *Ayurvedic Drugs and Their Plant Sources*, 256-273 (1996)
8. Dutt, Dharm; Upadhaya, J. S. ; Malik, R.S.; Tyagi, C. H. Studies on the pulp and paper making characteristics of some Indian non-woody fibrous raw materials. I. , *Cellulose Chemistry and Technology,* **39**(1-2): 115-128 (2005).
9. P. Oudhia. Botanical.com/site/column-poudhia/83-mites,html
10. I. m. Hueza , E. S. M. Fonseca, Evaluation of immunomodulatory activity of *Ipomoea carnea* on peritoneal cells of rats*, Journal of Ethnopharmacology,* **87**: 181-186 (2003).
11. Harborne, J. B., Methods of plant analysis. In: Phytochemical methods. Champan and hall, London New York (1984).