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Research Article

Pharmacognostical, Physicochemical and Chromatographic estimation of rhizomes and rhizome oil of *Alpinia speciosa* Roxb.

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Abstract

Alpinia speciosa Roxb. (Zingiberaceae) is a widely used medicinal plant in the many parts of the World including India the management of various conditions including pain, inflammation and fevers conditions. In the present study the physico-chemical and chromatographic estimation of rhizome and volatile oil of rhizome were investigated and were reported.

Keywords: *Alpinia speciosa*, Physicochemical, Volatile oil, Rhizome

Introduction

The use of medicinal plants is an ancient practice common to all societies. About 80% of the world population living in developing relies on traditional medicine for their primary health care need .The world Health Organization encourages the inclusion of herbal medicine of proven efficacy and safety in health care delivery system of developing countries. There is, therefore, a need to validate the folkloric claim of the medicinal plants used in traditional medicine so that the beneficial ones can be deployed as phytomedicines while the bioactive constituents from such beneficial plants could be isolated and used as "leads" in drug discovery process.[1-3]

Alpinia speciosa K. Schum (Family: Zingiberacea) commonly known as "sittarattai" in Tamil and "chatium" in Hindi, is useful in treating various diseases. The essential oil of this species is found to be useful in the treatment of high blood pressure and used as a heart tonic. It is also used for treating cold, fever, flatulence, indigestion, diuretic, antimicrobial activity, etc. in various traditional systems of medicine.[4] Till date no any systematic study was performed to revealed rhizome volatile oil standards and pharmacognostical studies. Therefore, the present work was undertaken.

Materials and Methods

Collection and Authentication of Plant Material

The rhizomes of *Alpinia speciosa* were collected in the month of July 2008 from ABS Botanical garden Karipatti, Salem, (T.N.), identified and authentified by Mr. A. Balasubramanian, Consultant Central Siddha Research, Salem, (T.N.).

Physico-chemical constant determination

The collected rhizomes were washed with water, dried, powdered and subjected to the following physico-chemical constant determinations. [5]

Phytochemical studies

The collected fresh rhizomes were subjected to hydro distillation to isolate the volatile oil using Clevenger's apparatus and purified by using anhydrous sodium sulphite. The physical parameters of the distilled volatile oils viz, solubility, specific gravity, refractive index, optical rotation and boiling point were carried out. [5-6]

Distillation of volatile oil

Fresh rhizomes of *Alpinia speciosa* were washed thoroughly, crushed, weighed and packed in the distillation flask separately and added required quantity of water and few pieces of porcelain bits were placed to avoid the bumping during distillation. The Clevenger's apparatus with graduated receiving tube distillation unit was fixed to the distillation flask and the graduated receiver was filled with water. Distillation flask was heated on the heating mandel and the extraction was continued for 4 hours. The oil distilled was collected from the graduated receiver, purified by using anhydrous sodium sulphite and the percentage yield was calculated.[7]

Physical parameters of volatile oil

The volatile oil obtained from the rhizomes of Alpinia speciosa was subjected to determine the various physical parameters viz., solubility, specific gravity, refractive index, optical rotation and boiling point.[8]

Thin Layer Chromatography[9-11]

TLC Plate

Precoated silica gel G plates (Merck) with the size of (10x2.0 cm) were used.

Application of the volatile oil for separation

The volatile oil of 100% strength was taken in a capillary tube and it was spotted on pre-coated silica get G plate, 2 cm above from its bottom with a diameter ranging form 2 to 5mm. The different spots developed in each solvent were identified by means of spraying reagent namely vanillin in sulphuric acid.

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Preparation of Vanillin in Sulphuric Acid (Visualizing agent) Solution A: 1% solution of vanillin in ethanol was prepared. Solution B: 5% of solution of sulphuric acid in ethanol was prepared. Equal volumes of A and B solution was mixed, when required.

TLC of volatile oil

The TLC was carried out for the volatile oils obtained from Alpinia speciosa using toluene: ethyl acetate (93:7) and benzene: ethyl acetate (95:5) as mobile phase. The visualizing agent used was Vanillin sulphuric acid.

Results and discussion

Physico-chemical constants determination

Ash values

The physicochemical analysis of rhizome powder was carried out. In this study ash values (total ash, acid insoluble ash, water soluble ash and sulphated ash) were determined. The total ash value was found to be 3.98% w/w indicating the considerable presence of inorganic radicals. The acid insoluble ash, water soluble ash and sulphated ash values were found to be 0.40% w/w, 2.80% w/w and 3.68% w/w respectively. (Table 1)

Extractive values

Extractive values (water soluble and alcohol soluble extractive value) were determined. The water soluble and alcohol soluble extractive values were found to be 12.43 % w/w and 7.32 % w/w respectively. The water soluble and alcohol soluble values indicate the presence of amount of constituents which are water and alcohol soluble. The water soluble extractive value was found more than alcohol soluble extractive value. (Table 1)

Phytochemical studies of distilled volatile oil

Percentage yield

The percentage yield of the rhizomes volatile oil of *Alpinia speciosa* was found to be 0.50% v/w.

Physical parameters of volatile oil

The physical parameters of the volatile oil obtained from the rhizomes of *Alpinia speciosa* showed similar solubility character and less variation in specific gravity, optical rotation, refractive index and boiling point. The results were shown in Table 2 and 3. **Thin Layer Chromatography**

In toluene: ethyl acetate (93:7) solvent system, the volatile oil gave 9 coloured spots (Figure no.4.). By using benzene: ethyl acetate solvent system (95:5), the volatile oil again showed 9 coloured spots (Fig. 1). The R_f values and colour of spots were shown in Table 4.

Conclusion

The present study does give valuable information about identification of the plant. The ash values and extractive values are used to determine the quality and purity of the crude drug of *Alpinia speciosa*. The physical parameters (solubility, specific gravity, refractive index, optical rotation and boiling point) are used to evaluate essential oils. TLC is used to analyze the compounds present in essential oil. In TLC, toluene: ethyl acetate (93:7) and benzene: ethyl acetate (95:5) solvent systems, *Alpinia speciosa* showed 9 coloured spots

Reference

1) Usman H., Yaro A.H. and Garba M.M. (2008). Analgesic and Anti-inflammatory Screening of *Newbouldia laevis* flower in rodents. *Trends Med. Res.*, 3:10–5.
2) Farnsworth N. (1998).Screening plant for new medicines. In: Wilson EO, editor. Biodiversity. Washington DC: Natural Academy Press.
3) Amos S., Kolawole E., Akah P., Wambebe C. and Gamaniel K. (2001). Behavioral effects of the aqueous extract of *Guiera senegalensis* in mice and rats. *Phytomedicine*, 8:356–61.
4) Smith R.M. (1990). Alpinia (Zingiberaceae): A proposed new infrageneric classification. *Edinburgh Journal of Botany*, 47(1): 37.
5) Kokate C.K., Gokhale S.B. and Pawar A.P. (1995). *Practical Pharmacognosy* (Techniques and Experiments), Second edition, 140-141.
6) Kokate C.K. (1991). *Practical Pharmacognosy*, third edition P.123-124.
7) Guenther E. (1995). *The Essential Oil*, 1, 111-113.
8) Atal C.K., Kapur B.M, Thappa R.K., Agarwal S.G. and Dhar K.L. (1989). Cultivation and utilization of Aromatic plants, Role of Physical and Chemical methods in the analysis of essential oils, 90-91.
9) Touchstone J.C. and Dobins H.F. (1978). *Practice of Thin Layer Chromatography*, 82.
10) Iyangar M.A. and Nayak S.G.K. (1996). *Pharmacognosy Lab manual*, Revised edition, 89.
11) Divakar Madhu C. (2002). *Plant Drug Evaluation, A laboratory Guide*, IInd edition, 95.

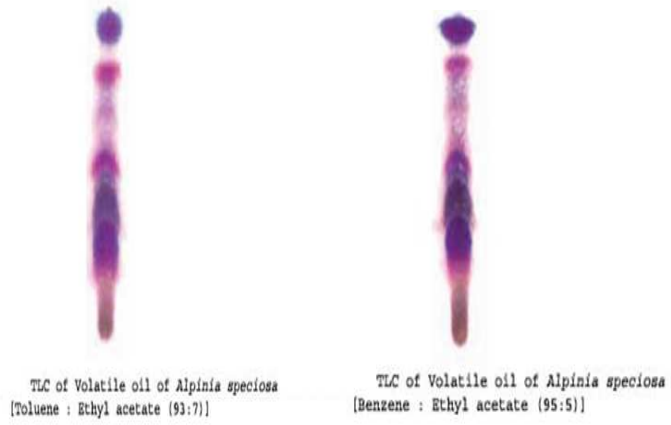

Fig. 1: TLC of Volatile oil of *Alpinia speciosa*

Table 1: Physico-chemical constants of the rhizomes of *Alpinia speciosa* K. Schum.

Name of the Plant	Total Ash (% w/w)	Acid Insoluble Ash (% w/w)	Water Soluble Ash (% w/w)	Sulphated Ash (%w/w)	Alcohol Soluble Extractive Value (%w/w)	Water Soluble Extractive Value (%w/w)
Alpinia speciosa	3.98	0.40	2.80	3.68	7.32	12.43

Table 2: Solubility Parameters of Volatile oil

S/No.	Solvents	Solubility
1.	Toluene	Completely soluble
2.	Acetic anhydride	Slightly soluble
3.	Chloroform	Soluble
4.	Acetone	Soluble
5.	Petroleum Ether	Completely soluble
6.	Benzene	Completely soluble
7.	Methanol	Soluble
8.	Ethyl acetate	Completely soluble
9.	n-butyl alcohol	Soluble
10.	Water	Insoluble
11.	Dimethyl formamide	Soluble

Table 3: Some other physical parameters of volatile oil

Name of the plant	Specific gravity	Refractive index	Optical rotation	Boiling point
Alpinia speciosa	0.9840	1.5048	+4.20	43^{0} c