Volume : 3 | Issue : 1 | January 2014 • ISSN No 2277 - 8179

Research Paper

Biochemical and Phytochemical Analysis of The Medicinal Plant, Kaempferia Galanga Rhizome Extracts

Biochemistry

KEYWORDS : Kaempferia galanga, plant extracts, Phytochemical and Biochemical analysis

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ABSTRACT

Kaempferia galanga is medicinal plant belongs to the family Zingiberaceae treated as a rare folk medicinal herb from ancient times. Kaempferia galanga rhizome aqueous, methanol, ethanol, ethyl acetate and chloroform extracts has been tested in the present investigation. The ethanolic extract of Kaempferia galanga (14) has shown more number of components compared to other tested extracts (4 to 12). The phytochemical and biochemical components like Carbohydrates, Cholesterol, Protein, Amino acids, Steroids, Alkaloids, Flavonoids, Cardiac glycosides, Saponins. Tannins, Terpenoids, Phlobatinins, Fatty acids, Coumarins and Phenols may be present in the extracts.

Introduction

The family Zingiberaceae consists of large number of medicinal plants and is well known for use in ethno medicine. The study of this family indicates systematically analyze, and the use of Zingiberaceae plants for the treatment of various human ailments from NE India, in order to the valuation of biodiversity and its conservation and for future pharmacological studies **[1]**. The various medicinal plants are good sources for nutrient and non nutrient molecules, many of which have anti-oxidant and anti-bacterial, anti-viral and anti-fungal properties which can protect the human body against cellular oxidation reactions and pathogens [2**]**. The volatile oils of plants are generally isolated from plant material by steam distillation or hydro distillation and are variable mixtures of terpenoids, like monoterpenes[C_{10}], sesquiterpenes [C_{15}] and diterpenes [C_{20}] may also be found, and a mixture of low molecular weight aliphatic hydrocarbons (linear, saturated and unsaturated), alcohols, aldehydes, acids, acyclic esters or lactones and exceptionally nitrogen- and sulphur-containing compounds, coumarins and homologues of phenyl propanoids **[**3].

Kaempferia galanga is medicinal plant belongs to the family Zingiberaceae treated as a rare folk medicinal herb [4]**.** It is commonly known as *kencur*, sand ginger, aromatic ginger, resurrection lily or cutcherry. The Telugu vernacular name for this plant is Kachoram. The plants are available in Kerala, Andhra Pradesh and other few regions in India. The plant show vegetable propagation and regeneration takes place through rhizomes.

Kaempferia galanga L. is used in the preparation of both traditional and modern medicines from ancient times. The rhizome of *Kaempferia galanga* is used by people in many regions has been extensively used for treatment of various disorders including relieving toothache, abdominal pain, muscular swelling, hypertension, rheumatism, scariasis, bacterial infections, tumor, asthma and rheumatism [5,6,7].

Several Chinese medicinal plants shown immune modulatory and anti-tumour activities. A large amount of the anti-tumour activities of these Chinese herbs are probably due to their immune stimulating polysaccharide components [8].

Materials and Methods

Plant Materials: The fully mature tubers of *Kaempferia galanga* are collected from Visakhapatnam District, Andhra Pradesh during July and August 2012. The tubers were washed thoroughly and dried in sunlight.

2.1 Extraction of Plant Materials

Nearly 30g of air dried powder were taken in 200ml of aqueous, methanol, ethanol, ethyl acetate and chloroform separately, plugged with cotton wool and then kept on orbital shaker for 48 hours with 150rpm at room temperature. The extracts were filtered with whatmann no 1 filter paper and collect the supernatant. Then solvent evaporated through rotavapour and make the final volume one-fourth of the original volume and stored at the 4°C in air tight containers.

2.2 Preliminary Phytochemical Screening

The various extracts of *Kaempferia galanga* L. were used for preliminary screening for phytochemicals such as carbohydrates (molisch's test), cholesterol (liberman burchard test), protein (biuret test), amino acid (ninhydrin test), alkaloid (Mayer's and Dragandreff's test), saponins, tannins, flavinoids, cariac glycosides, terpenoids and phlobatanins.

2.3 Screening Procedures

2.3.1 Test for Amino Acids

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

2.3.2 Test for Proteins

To 2ml of the extract add the 2ml of biuret reagent. A violet color ring indicated the presence of peptide linkages of the molecule.

2.3.3 Test for Carbohydrates

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

2.3.4 Test for Alkaloids

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

2.3.5 Test for Steroids

To 2ml of acetic anhydride was added to 0.5ml of extract added to 2ml of H_2SO_4. The color change from violet to blue or green indicated the presence of steroids.

2.3.6 Test for Cholesterol

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

2.3.7 Test for Cardiac Glycosides

5ml of extract was treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution. This was underlayed with 1ml of conc.H_2SO_4. A brown ring of the interface indicated a deoxy sugar characteristic of cardenolides. A violet ring might appear below the brown ring where as the acetic acid layer, a greenish ring might form just gradually throughout thin layer

2.3.8 Test for Flavonoids

5ml of dilute ammonia solution were added to a portion of aqueous extract and add conc.H_2SO_4. A yellow coloration is observed which confirms the presence of flavonoids and it disap-

Volume : 3 | Issue : 1 | January 2014 • ISSN No 2277 - 8179

pears on standing.

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

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

2.3.11 Test for Terpenoids
To 2ml of extract add 2ml of chloroform and 3ml of conc.H_2SO_4 to form a monolayer of reddish brown coloration of the interface was showed to form positive result for the terpenoids.

2.3.12 Test for Phlobatinins
When an aqueous extract was boiled with 1%aqueous HCl, red precipitate was deposited which was taken as evidence for the presence of phlobatinins.

2.3.13 Test for Fatty Acids
0.5ml of extract was mixed with 5ml of ether. These extract was allow it for evapouration on filter paper and dried the filter paper. The appearance of transparence on filter paper indicates the presence of fatty acids.

2.3.14 Test for Anthocyanins
2ml of extract is added to 2ml of 2N NH_4Cl and ammonia. The appearance of pink-red color turns to blue violet color indicates the presence of anthocyanins.

2.3.15 Test for Leucoanthocyanins
5ml of aqueous extract added to 5ml of isoamylalcohol. Upper layer appears red in color indicates for the presence of leucoanthocyanins

2.3.16 Test for Coumarins
3ml of 10%NaOH was added to 2ml of aqueous extract formation of yellow color indicates the presence of coumarins.

2.3.17 Test for Phenols
Take 2ml of extract to add 3ml of ethanol and a pinch of $FeCl_3$ to form greenish yellow color indicate the presence of phenols

2.3.18 Test for Quinones
Take 2ml of extract to add 3ml of concentrated HCl to form green color indicates the presence of quinones.

2.3.19 Test for Emodins
Take 2ml of NH_4OH and 3ml of benzene was added to the extract. Appearance of red color indicates the presence of emodins.

Results and Discussion
Kaempferia galanga belongs to the family Zingiberaceae grows as tropical and perennial herbs.

The present study carried out on the plant tuberous rhizomes that revealed the presence of medicinally active metabolites. The phytochemical characters of *Kaempferia galanga* tuberous rhizome extracts are showed in Table 1.

Table1. Phytochemical screening of *Kaempferia galanga* tuberous rhizomes

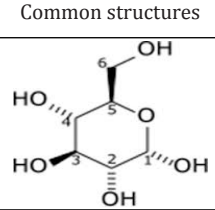
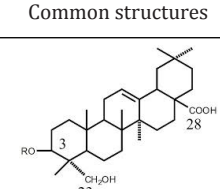
Name of the compound	Aqueous extract	Chloroform extract	Ethanol extract	Ethyl acetate extract	Methanol extract
Amino acids	+	+	+	+	+
Protein	-	-	-	-	-
Carbohydrates	+	+	+	-	+
Alkaloids	+	+	+	-	+
Steroids	-	-	+	-	+
Cholesterol	-	+	+	-	+
Cardiac glycosides	+	+	+	+	+
Flavonoids	-	-	+	-	-
Saponins	-	+	+	-	-
Tannins	+	+	+	+	+
Terpenoids	-	-	+	-	+
Phlobatinins	+	-	+	-	+
Fatty acids	-	+	+	+	+
Anthocyanins	-	-	-	-	-
Leucoanthocyanins	-	-	-	-	-
Coumarins	+	-	+	-	+
Phenols	+	-	+	-	+
Quinones	-	-	-	-	-
Emodins	-	-	-	-	-

The ethanolic extract of *Kaempferia galanga* (14) has shown more number of components compared to other tested extracts (4 to 12)

The above Biochemicals and phytochemicals may show good biological activities. The common structurs for the compounds has been shown in Table 2.

Table 2 shows medicinal components that may present in the isolated from for ethanolic tuberous rhizome extract of *Kaempferia galanga*.

The study of ethanomedical properties these with traditional medicines associated with the use of medicinal plants in treatment of diseases. The screening of plant extracts and the natural products can reveal the potential sources of new agents for processing of natural products that can be used for various activities like antimicrobial, anti oxidant activities etc.

Molecule	Common structures	S .No	Molecule	Common structures
Carbohydrate		8	Saponins	

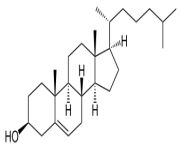
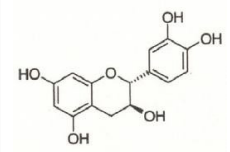
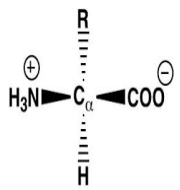
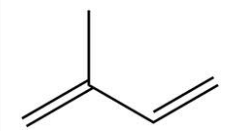
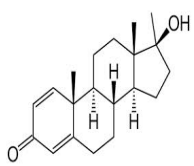
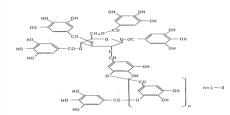
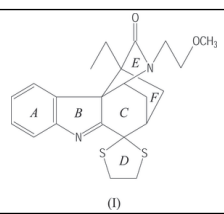
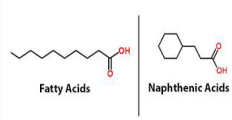
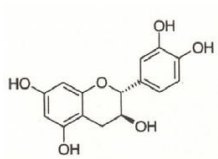
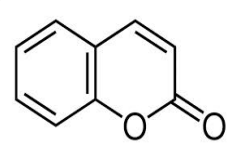
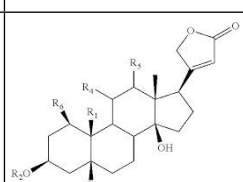
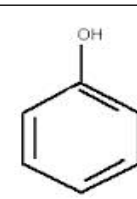
Cholesterol		9	Tannins	
Amino acids		10	Terpenoids	
Steroids		11	Phlobatinins	
Alkaloids		12	Fatty acids	
Flavonoids		13	Coumarins	
Cardiac glycosides		14	Phenols	

Table 2: Common structures for Biochemicals and Phytochemical compounds from tuberous rhizome extracts of *Kaempferia galanga*

Conclusion

The phytochemical and biochemical components like Carbohydrates, Cholesterol, Protein, Amino acids, Steroids, Alkaloids, Flavonoids, Cardiac glycosides, Saponins. Tannins, Terpenoids, Phlobatinins, Fatty acids, Coumarins and Phenols will be present in the isolated components from rhizome extracts of *Kaempferia galanga*

Acknowledgement

The author would like to thank GITAM University for providing lab facility and access to ejournals to carry out the research.

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