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Research Article

A PRELIMINARY PHYTOCHEMICAL SCREENING OF A LESSER KNOWN SPECIES OF *Garcinia*- *Garcinia acuminata* Plancho and Triana

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ABSTRACT

Garcinia acuminata Planchon and Triana, is a lesser known species belonging to the genus *Garcinia*. Though it has been used by the people of North-east India as a traditional medicine to cure a range of problems of stomach and skin in either cooked or in raw form, scientific evaluation of its medicinal properties has not been done so far. The current study is an attempt to determine its various phytochemical constituents so that it can be further used as a potent source in the creation of novel drugs in future.

Keywords: *Garcinia acuminata* Planchon and Triana, Phytochemical constituent, Cardiac glycoside, Saponins, Lignin, Terpenoids, Reducing sugar, Phenols, Alkaloids,

INTRODUCTION

Phytochemicals are the dependable sources for the treatment of different health problems. Plants offer a large range of natural compounds belonging to different molecular families which offer various properties to humans. In most of the traditional systems of treatment, the use of medicinal plant include the fresh or dried part, whole, chopped, powdered or an advanced form of the plant usually made through extraction with different solvents play a major role and constitute the backbone of the traditional medicine [Biswas and Mukherjee, 2003].

Garcinia is a large genus of polygamous trees or shrubs, distributed in the tropical Asia, Africa and Polynesia and is a rich source of bioactive molecules including xanthones, flavonoids, benzophenones, lactones and phenolic acids [Selvi *et. al*., 2003]. Phytochemical studies showed that these plant species are rich in a variety of prenylated xanthones and the constituents had demonstrated a number of bioactivities. *Garcinia acuminata* Planchon & Triana [Fig 2], locally known as "Mahi thekera" in Assam, is one of the lesser known species within this genus found growing wildly but rarely in Upper Assam of North-East India. Its fruit is either eaten raw or cooked to cure many stomach and skin problems. Scientific evaluation of this species has not been done or found so far in any literature and as such it was taken as the subject of study for the current phytochemical analysis.

MATERIALS AND METHOD

Fresh plant samples of the test species were collected from various parts of Jorhat and Sibsagar district of Assam [Fig1] within the period of February- August, 2011 and submitted to Department of Botany, Gauhati University for identification.

Preparation of the leaf and stem extract

The leaves of the plant species were washed with 70% alcohol and rinsed with sterilized distilled water. The leaves were then air dried and homogenized to powder and stored in airtight bottles. Dried leaves and stem powder were mixed with extracting solvent such as Water, Methanol, Chloroform, Dichloromethane, Petroleum ether and Acetone. The mixture was then filtered and sterilized by using Sintered glass filter [Grade 5, pore size 1-2µ, Borosil]. The filtrate was freeze dried. These extract were used for various phytochemical screening.

Preparation of fruit extract

The whole fruit of *G. accuminata* were dried, mixed with extracting solvents as used for the above extracts and extracts were prepared from them.

Preliminary phytochemical screening

The preliminary phytochemical screening of the various extracts was carried out for the detection of various phytoconstituents using standard procedure as given by Trease and Evans, [1996] Sofowara [1993] and Harborne [1973]. The solvents used for the study were petroleum ether, chloroform, ethyl acetate, methanol, ethanol and water. All the plant extracts were qualitatively tested for the presence of various chemical constituents like Phenols, Tannins, Alkaloids, Flavonoids and reducing sugar.

Cardiac glycoside [Keller-Killani test]

About 500 µg of the extract was dissolved in 2 ml of glacial acetic acid containing 1 drop of 1% $FeCl_3$. This was under laid with conc. H_2SO_4. A brown ring obtained at the interface indicated the presence of a deoxy sugar, characteristic of cardiac glycosides. A violet ring may appear below the ring while in the acetic acid layer, a greenish ring may form just above ring and gradually spreads throughout this layer.

Tannins

About 500 µg of the extract was dissolved in 5 ml of distilled water. Two to three drops of 10% of $FeCl_3$ was added to the extract. The production of a blackish-blue or blackish-green colouration gives positive result for tannins.

Carbohydrate

The extract was dissolved in 5 ml of water and tested by Benedict's solution. About 0.5ml of Benedict's reagent was added the extract. The mixture was heated on a boiling water bath for 2 min. A characteristic color indicated the presence of sugar.

Saponins

About 500 µg of the extract was mixed with 5 ml of distilled water and shaken vigorously for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken and observed for the formation of emulsion.

Terpenoids (Salkowski test)

About 500 µg of the extract was mixed in 2 ml of chloroform, and 3 ml of concentrated H_2S0_4 was carefully added to form a layer. A reddish brown colouration of the inter face was formed to show positive results for the presence of terpenoids.

Alkaloid

Solvent free extract of 50mg was stirred with few ml of Hydrochloric acid and filtered. The filtrate was tested carefully with Mayer's reagent. About 500 µg of the extract was mixed with two drops of Mayer's reagent by the side of the test tube. A white or creamy precipitate indicated positive test.

Flavonoids

Two methods were used to determine the presence of flavonoids in the plant sample (Sofowara, *1993;* Harbrone, *1973*).

1. 5 ml of dilute ammonia solution were added to about 500 µg of the extract and then concentrated H_2SO_4 was added. A yellow colouration was observed in each extract indicating the presence of flavonoids.

2. A few drops of 1% aluminium solution were added to about 500 µg of the extract. Yellow colour indicated the presence of flavonoids.

Phenolic content

0.5 ml of FeCl3 (w/v) solution was added into 2 ml of test solution, formation of an intense colour indicated the presence of phenols [Gibbs R.D., 1974].

RESULT AND DISCUSSION

The results of preliminary phytochemical screening of various extracts of *G. acuminata* are given in table 1. The results revealed that flavonoids, terpenes, cardiac glycosides and phenolics were present in both the alcoholic as well as aqueous extracts of *G. acuminata* leaves but alkaloids were present only in alcoholic extract. All the types of extracts in various forms showed the presence of phenol in various concentrations. The leaf and stem extract of *G. acuminata* did not exhibit the presence of any reducing sugar. The water extracts of the fruit showed the presence of saponins. All the test samples exhibited the presence of cardiac glycosides at different rates except for acetone and petroleum ether in various concentrations.

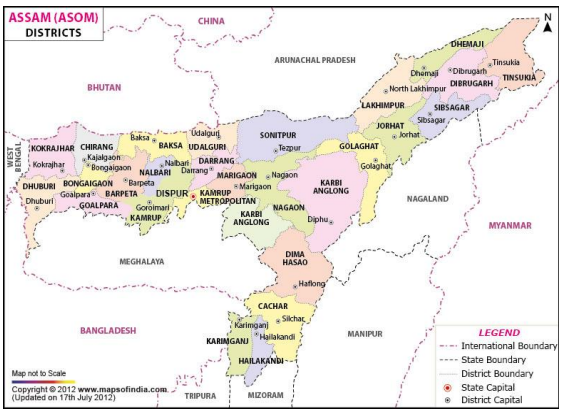

Fig. 1: District map of Assam

Fig. 2: *Garcinia acuminata* Plachon and Triana

Table 1: Phytochemical screening study of *G. acuminata Planchon & Triana*

Test For Cardiac Glycoside							
Extract	**Water**	**80% Ethanol**	**70% Methanol**	**Chloroform**	**Acetone**	**Dichloro Methane**	**Petroleum Ether**
Leaf	+++	++	+++	++	_	++	_
Stem	+++	++	+++	++	_	++	_
Fruit	++++	++	+++	++	_	++	_
Test For Tannin							
Leaf	+++	+	+++	-	-	-	-
Stem	+++	+	+++	-	-	+++	-
Fruit	+++	++	+	-	+++	+++	-
Test For Reducing Sugar(Cardohydrate)							
Leaf	-	-	-	-	-	-	-
Stem	-	-	-	-	-	-	-
Fruit	-	+	+	+	-	+	-
Test For Saponin							
Leaf	+	-	+	-	-	-	-
Stem	-	-	-	-	-	-	-
Fruit	+	-	+	-	+	-	-
Test For Terpenoids							
Leaf	-	-	-	+	-	+	-
Stem	-	-	-	-	-	-	-
Fruit	++	++	++	++	-	+++	++
Test For Alkaloids							
Leaf	-	+	+	-	-	-	-
Stem	-	-	-	-	-	-	-
Fruit	-	-	+	-	-	+	+
Test For Flavonoids							
Leaf	-	-	+	+	-	+	-
Stem	-	-	-	-	-	-	-
Fruit	+	++	++	+	-	+	-
Test for phenols							
Leaf	-	++	++	-	++	+	-
Stem	-	++	++	-	++	+	-
Fruit	-	++	++	-	++	+	-

*++++ High rate +++ medium ++ low -- absent

CONCLUSION

The curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites. The present study indicated that the alcoholic and aqueous extracts of *G. acuminata* contained many bioactive chemical constituents like alkaloids, flavonoids, cardiac glycosides, phenolics and saponins but lack reducing sugar which was found only in trace amount in fruits. The active components usually interfere with growth and metabolism of microorganisms in a negative manner [Aboada and Efuwape, 2001]. The alkaloid and flavonoid content of plant materials has severally been reported to be a major antioxidant, anti-inflammatory and analgesic active principle; while tannins and phlobatannins has been reported to have wound healing properties. Several phenolic compounds like tannins present in the cells of plants are also potent inhibitors of many hydrolytic enzymes such as proteolytic macerating enzymes used by plant pathogens while saponin is a bioactive antibacterial agent used in hypercholesterolemia, hyperglycemia, antioxidant, anticancer, anti-inflammatory and weight loss etc. [Mandal *et al.,* 2005 and Manjunatha, 2006] which were found to be present in the tested plant species. Many plants contain non-toxic glycosides that can get hydrolyzed to release phenolics that are toxic to microbial pathogens. Presence of phenolics in the extracts of *G.acuminata* indicated its antibacterial property as phenolic compounds are thought to be toxic to micro organisms, inhibiting the enzymes which are essential for the growth of microorganism [Govindachari TI *et. al.* 1971 and Rao P *et. al*. 1973]. All these study suggest the possible exploitation of this plant in the management of the infectious diseases. It is hoped that the preliminary tests may be useful in detection of the bioactive principles and subsequently may be lead to the drug discovery and development. Further purification of the extract may yield novel antibacterial drug in the future specially from the fruits of the plant. Considering the rich diversity in its phytochemical constituents, it is expected that further screening and scientific evaluation of the plant extracts of *G. acuminata* Plancho and Triana for their antimicrobial activity may provide some more new antimicrobial substances which can be used for medicinal purposes in the near future.

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