

Evaluation of Phytochemical, Pharmacognostical and Antibacterial Activity of *Garcinia Gummicutta* Leaves

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Summary

Evaluation of the leaves of *Garcinia gummicutta* (Guttiferae) has been carried out the present study. This study was analysis of macroscopically characters, microchemical tests, behavior on the powder, treatment with different chemical reagents, physical constant values, fluorescence analysis and preliminary phytochemical investigation. The conclusion of the present reports on the alkaloid, terpenoid, steroid, oil, catachin and phenol were found to be leaves extract of *G. gummicutta* leaves and its on the active compounds may be acted as antibacterial activity.

Introduction

Since the dawn of time plants have provided for all of Man's needs varying from shelter to clothing, food, dyes, fragrances, flavours, and medicines. There is ample archaeological evidence indicating that medicinal plants were regularly employed by people in prehistoric times. Through extensive experimentation and research, the biodynamic activities of the phytochemical plant constituents were gradually discovered and exploited for specific medical application. The science of medicinal plants in India was at the peak of its glory during the Vedic period (2000BC-800BC). "Vrikeyasurveda" a treatise written by Parasara during the pre - Christian era was the most authentic text book for students of indigenous medicine in India. The name of Charaka, Sustra and Dhanvanthri, Ayurvedic physicians are well known and they never need any formal introduction. Late with the establishment of Mughal's rule in India from the 13th centaury onward, the Medieval Greeco-Arab system, more commonly known as the Unani - Tibia system which also advocated the use of plants as medicine also become popular. However, these systems become less important, because of the lack of proper identification of the medicinal plants (1). It is a well known fact that systematic description of medicinal or non medicinal plants but plants as given as regional/national floras in modern taxonomy is very helpful in the correct identification of the species. Most useful characteristics in such identification include characters of inflorescence, flower, fruit and seeds. However, most medicinal plants are collected and used in the preflowering stages. This may lead to the correct identification of medicinal plants. The science of quantitative or analytical microscopy is very important tools in the identification of medicinal plants (2-3). *Garcinia gummicutta* is belongs to the family Cuttiferae, which was endemic to Southern Western Ghats, South India. The plants is Tamil name known as "kodampul" which plant parts of leaves and fruits were used as culinary purposes. The present study was phytochemcial, pharmacognostical and antibacterial activity of fruits were evaluated in the leaves of *Garcinia gummicutta*.

Materials and Methods

Plant materials of *Garcinia gummicutta* were collected from Courtallam Forest, Tirunelveli Hills, Tamil Nadu. Specimens are identified by senior author. About 250g of the air-dried powdered sample was sequentially extracted in a Soxhlet extractor with the following solvents: petroleum ether, chloroform, acetone, and distilled water. The crude extract were concentrated in vacuum, properly labeled and stored in the refrigerator at 4°C until used. Leaf extracts were subjected to qualitative phytochemical screening based on the methods (4-8) for the identification of phytochemical constituents. Total ash, acid-insoluble ash, water soluble ash and sulfated ash values of the dry bark powder of *Garcinia gummicutta* was obtained (4). Extracts were prepared with various solvents by standard methods (4). Percentage of the dry extracts was calculated. Behaviour with chemical reagents were performed on the crude leaf powder of *G. gummicutta* using different chemical reagents to detect the phytoconstituents with colour changes under ordinary daylight by the standard method (6). All the bark extracts obtained were examined in daylight, short and long-UV to detect the fluorescent compounds by the standard method (7). Colour and consistency of the extracts (6). The following microorganisms were used for detecting antibacterial extracts of *Garcinia gummigutta*: *Aeromonas hydrophila*, *Bacillus subtilis*, *Klebsiella pneumoneae*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Staphylococcus aureus* and *Streptococcus pyogenes*. The bioassay used was the standard disk diffusion assay adapted from Taylor et al. (9). Test disks were prepared by dipping and saturating sterilized filter paper disks in plant extracts. Same sized filter paper disks (6 mm diameter) absorbed the same volume of extract. For negative control methanol paper disks were used, prepared by dipping the disk into the methanol, while tetracycline paper disks were used as positive control. For tetracycline paper disks 10 mL solution was prepared mixing 0.8mL tetracycline solution (prepared by dissolving 500mg tablets of tetracycline in 20mL methanol) with 9.2mL of methanol. The final concentration of tetracycline was 0.25mg/mL. The extract that showed antibacterial activity were tested to inhibitory concentration (MIC) for chosen bacteria *Aeromonas hydrophila* and *Pseudomonas aeruginosa* were grown in nutrient broth 10^6 cells/ml was inoculated in tubes nutrient broth supplemented with different concentrations respectively. Afterwards 24 h at 37° C, the MIC of each sample measuring the optical density in the spectrophotometer (620nm).

Results and Discussion

The results of the detailed description of the medicinal plants of *Garcinia gummi – gutta* (L.) Robs. Trees, 15m tall, branchlets terete, glabrous, Leaves elliptic-lanceolate, 6-12 × 3-4cm, membranous, glossy above, glabrous, base-cunneate, margin thin, apex acute; petioles 1.5cm long, slender. Male flowers 1.5cm diameters, pink, in axillary fascicles; pedicels terete, 1cm long; bracts ovate, 6mm long. Calyx-lobes ovate, 5mm long. Petals oblong, 6.3mm long ink. Stamens many, irregular; filaments connate below 0.74mm long; anthers ovates, 1-24mm long. Pistil lodes 5mm long, Berries globose, 6cm long, orange 6-10 grooved, with persistent. Calyx, seeds oblong, 1-2cm long. The evaluation of the Moisture, total ash, acid soluble ash, water soluble ash values of the dry leaves of *Garcinia gummicutta* was obtained table-1. Percentage of the dry extracts were calculated and represented in table - 2. Higher percentage of chloroform extract was yielded (4.6%) and minimum percentage of water extract yielded (1.23%). Behavior of the powdered drug of *G. gummi – gutta* (L.) leaves on chemical regents and results seen in table -3. Fluorescence characters of extracts of *G. gummi – gutta* (L.) leaves powdered drugs were treated the under ultra violet in different solvent are results presented in table-4.

Table 1: Physico – chemical characters of *Garcinia gummi – gutta* (L.) leaves.

Sl. No	Physical contents	Values(%)
1.	Total ash	7.78
2.	Water soluble ash	3.63
3.	Acid insoluble ash	2.46
4.	Moisture contents	13.63

*Percentage of values are triplicates

Table 2: Extractive values of *Garcinia gummi – gutta* (L.) leaves

Sl. No	Extracts	Values*(%)
1.	Petroleum ether	3.5
2.	Chloroform	4.6
3.	Alcohol	2.7
4.	Water	1.23

Table 3: Behaviour of powdered of *G. gummi – gutta* (L.) leaves on chemical reagents

Sl. No	Reagents	Behavior
1.	Conc. HNO ₃	Yellow
2.	Conc. H ₂ SO ₄	Black
3.	HCL	Black
4.	Picric acid	Greenish yellow
5.	Sudan III	Pale yellow
6.	Ferric chloride	Brick
7.	Iodine solution	Orange

Identification of phytochemicals of petroleum ether extract of *G. gummicutta* leaves the presence of alkaloids terpenoids and oils was established but flavanone, sugar, catachin, sapanin and tannin were not detected. Chloroform extract of *G. gummicutta* leaves the presence of alkaloids, terpenoids, steroids, oils, catachin and phenol but, sugar, sapanin and tannin were not detected. Alcohol and aqueous extract of *G. gummicutta* leaves phytochemicals was presented in table-5. Extract showed significant antibacterial activity against all the seven bacteria tested. Results of antibacterial activities are presented in Table 6. The select 100 mg/ml concentration of the extract was taken 100 μ g and 200 μ g disc. Zones of inhibition produced by the 200 μ g extract were in between 23mm and 48mm. Antibacterial activity of *Garcinia gummicutta* was observed in *Aeromonas hydrophila* (28mm), *Bacillus subtilis* (26mm), *Staphylococcus aureus* (19mm), *Salmonella typhi* (17mm), *Pseudomonas aeruginosa* (23mm) and *Klebsiella pneumoniae* (16mm). Table- 7 seen in the results of the minimum inhibitory concentration (MIC) of the crude extract against *Aeromonas hydrophila* and *Pseudomonas aeruginosa* was determined and the values were 34 μ g/ml and 78 μ g/ml respectively. The present study on the antibacterial activity of the leaf extract of *Garcinia gummicutta* may be serve as a guide is the selection of the plants for further isolation and elucidation of active compounds of alkaloids, terpenoids, steroids, oils, catachin and phenol with antibacterial activity.

Table 4: Fluorescence characters of extracts of *G. gummi – gutta* (L.) leaves powdered drugs under ultra violet in different solvents.

Sl. No	Solvents used	Treatment	
		Under ordinary light	Under ultra – violet light
1.	As such	Light brown	Greenish yellow
2.	Petroleum ether	Pale yellow	Green
3.	Chloroform	Greenish yellow	Brownish yellow
4.	Alcohol	Olive green	Green
5.	Water	Light orange	Light green

Table 5: Preliminary phytochemical studies of different solvents extracts in *Garcinia gummi – gutta* (L.) leaves

Compounds	PEE	CE	EE	AE
Alkaloids	+	+	+	-
Triterpene / Steroids	+	+	+	-
Sugar	-	-	+	+
Oils	+	+	-	-
Phenol	-	+	+	-
Flavone	-	-	+	+
Catachin	-	+	-	+
Saponin	-	-	-	+
Tannin	-	-	-	+

“+” Present “-” Absent

Table 6: Antibiotic activity of *G. gummi – gutta* (L.) leaves extract against bacteria

Sl. No	Test organisms	Zones of Inhibitions (mm)*	
		100mg/ml	200mg/ml
1.	<i>Bacillus subtilis</i>	26	40
2.	<i>Klebsiella pneumoneae</i>	16	26
3.	<i>Aeromonas hydrophila</i>	28	48
4.	<i>Pseudomonas aeruginosa</i>	23	48
5.	<i>Salmonella typhi</i>	17	28
6.	<i>Staphylococcus aureus</i>	19	32
7.	<i>Streptococcus pyogenes</i>	14	23

Table 7: MIC of the extract of *G. gummi-gutta* against test organisms

Tested pathogen	MIC in $\mu\text{g/ml}^{-1}$
<i>Aeromonas hydrophila</i>	34
<i>Pseudomonas aeruginosa</i>	78

Conclusion

The conclusion of the present results on alkaloid, terpenoid, steroid, oil, catachin and phenol were found to be leaves extract of *G. gummicutta* leaves and its on the active compounds may be acted as antibacterial activity.

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