AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: http://www.ajptr.com/

Quantitative phytochemical and Physicochemical study of Caralluma Adscendens (Roxb.) Stem.

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ABSTRACT

Caralluma is a succulant plant, made into pickles, curry and also eaten as raw in the treatment of diabetes. The plant also reported to have anti-inflammatory, antinocicepive, antiulcer and gastroprotective activity. Tribals use the plant as a famine food. Hence it is necessary to investigate physicochemical and quantitative phytochemical parameters of the plant. Phytochemical study revealed presence of saponin, flavonoid, carbohydrates, proteins, vit. C, hence they were quantitatively determined. Haemolytic activity, using healthy human volunteer blood, was performed. *C. adscendens* is a vegetable of daily use. The calorific value, determined by Bomb calorimeter. From the result of quantitative determination and higher calorific value, the plant is said to have good neutraceutical potential. Saponin content may responsible for various reported activities.

Keywords: *Caralluma adscendens*, Quantitative Phytochemical study, Neutraceuticals

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Received 17 September 2012, Accepted 02 October 2012

Please cite this article in press as: Kulkarni AS. *et al.*, Quantitative phytochemical and Physicochemical study of Caralluma Adscendens (roxb.) Stem. American Journal of PharmTech Research 2012.

INTRODUCTION

The plant consists of fresh as well as dried aerial parts of *Caralluma adscendens* var. Fimbriata family Asclepediacae, commonly known as makadshingi, Karallamu in Telugu. This large group consists of tender succulents found wild in Africa, the Canary Islands, India, Arabia, southern Europe, Ceylon, and Afghanistan. In India, it is found in the dry hills of Andhra Pradesh, Warangal, and some other districts of Maharashtra. The star-shaped flowers are black, purple, yellow or red in colour and may appear in summer or autumn. Stems are angular with rudimentary leaves, these leaves tend to resemble spines.[1]As the plant is popular traditional food and also reported to have various activities, *t*he present study was undertaken to determine different phytoconstituents quantitatively and its neutraceutical potential[1].

Caralluma is a genus in the Asclepiadaceae family, commonly known as makadshingi. There are approximately 100 variable species in the genus. *Caralluma adscendens* is a vegetable of daily use and is made into pickles and chutneys also. This succulent is used amongst the labor classes in South India to enhance endurance. It is also used as a thirst quencher. Tribals use the plant as a famine food. The plant also reported to have anti-inflammatory, antinocicepive, antiulcer, gastroprotective activity and also in the treatment of diabetes. Phytochemical screening of *C. adscendens* showed presence of β-sitosterol along with other steroids and triterpenoids petroleum ether extract, methanolic and aqueous extract showed presences of proteins, carbohydrates and steroidal saponin glycosides as well as flavonoids are present in n- butanol extract[2,3]. *Caralluma* species have been used for centuries in semi- arid areas of Pakistan as emergency food[4] *Caralluma* species have shown anti- inflammatory[2], antiulcer[5], antidiabetic and antioxidant properties[2,6]. The Phytochemistry of genus *Caralluma* is characterized by many pregnane glycosides, while recently megastigmane glycosides also have been isolated from *Caralluma negevensis*[3] as well as few flavones. Hence it is necessary to investigate physicochemical and quantitative phytochemical parameters of the plant.

Figure 1: Plant *Caralluma adscendens*

***Caralluma adscendens* Var. Fimbriata:**

Biological source: - The plant consist of fresh as well as dried aerial parts of *Caralluma adscendens* var. Fimbriata family Asclepediacae

Local Names:

Tamil: Kullee Mooliyan, Kallimudayan

Telugu: Karallamu

Sanskrit: Yugmaphallottama

Marathi: Ranshabar, Makad Shenguli, Shindala Makadi

This large group consists of tender succulents found wild in Africa, the Canary Islands, India, Arabia, southern Europe, Ceylon, and Afghanistan. These plants may be grown outdoors in the warmer and drier parts of North America, or in greenhouses and window gardens. In India, it is found in the dry hills of Andhra Pradesh, Warangal, and some other districts of India, *Caralluma adscendens* Roxb. (syn *Caralluma attenuata* Wight) is found at altitudes of up to 600 meters.

The plants of this group vary from thin, recumbent stems from ½ to 1½ inch thick to erect growing clumps up to 8 inches high. The spines that cover the angled stems are actually leaves. The star-shaped, flowers of these plants are some of the worst smelling of the succulent plants. Ordinarily borne in late summer, the foul-smelling blossoms are usually colored purple, black, yellow, tan, maroon, red, or dark brown. They are from ½ to 2 inches or more across and borne at the base of the plant. In the wild, these blossoms are pollinated by flies, which are greatly attracted to the plant.

MATERIAL AND METHOD:

Plant collection and authentication:

Fresh whole plant of *Caralluma adscendens*, Asclepiadaceae (freely available) was collected from Satara District and Laling Ghat of Dhule District (India) and authenticated by Dr. D.A.Patil, Botanist, SSVPS Science College, Dept.of Botany, Dhule (MS), India. A voucher specimen (RCP/07 C) of plant material kept at Institute level.

Preparation of extracts:

The dried plant material was subjected to size reduction to a coarse powder by using pulveriser and passed through sieve (40#). This powder was packed into soxhlet apparatus and extracted successively with petroleum ether (60-80°), n- butanol, methanol and distilled water (yield 5.79, 13, 6.2, 7.1% respectively). All extracts were filtered and concentrated under reduced pressure using rotary evaporator (Roteva Equitron, Mumbai, India), and dried in vacuum dryer till

semisolid to solid mass was obtained and were stored in airtight containers in refrigerator below 10ºC.

Calorific Value:[1]

The plant is eaten as raw as well as made into pickles and used as famine food by tribal people. Hence calorific value of the plant is determined at Sayajirao Maharaja University, Baroda.

Phytochemical screening:

Qualitative chemical test were employed for the phytochemical screening of extracts for different constituents. Conventional protocol for detecting the presence of alkaloids, saponins, tannins, etc. was utilized.

Quantitative determination:

Qualitative chemical test revealed the presence of carbohydrate, protein, saponin, flavonoid, ascorbic acid. Hence attempt had been made to find out these phytochemical entities quantitatively.

Estimation of total Carbohydrate content by Phenol- Sulphuric acid method[6]

In hot acidic media glucose is dehydrated to hydroxy methyl furfural. This forms a green coloured product with phenol and has absorption maximum at 490nm. Total amount of carbohydrate present in the sample was calculated using standard graph. 500 µg/ ml glucose solution is used to plot calibration curve.

Estimation of Total proteins by Hartiee's method[8]

The powder is extracted with potassium disodium tartarate, proteins from extract allowed to react with Folin Ciocalteu reagent and measured at 650nm. The total protein was calculated from standard curve of BSA (Bovine serum albumin).

Estimation of Total Flavonoid content[9]

Known volume of extract was diluted with 80% aqueous ethanol (0.9ml). Aliquot of 0.5ml was added to test tube containing 0.1ml of 10% aluminum nitrate, 0.1ml 1 M aqueous potassium acetate and 4.3ml of 80% ethanol. After 40min at room temperature the absorbance was determine at 415nm with UV spectrophotometer. Total Flavonoid content was calculated according to a standard curve established with Quercetin.

Estimation of Total Saponin Glycosides[10]

Powder sample was extracted with 80 % methanol, two or more times. The solvent was distilled off and soft extract was treated with petroleum ether and ethyl acetate. Each time solvent was distilled off. The soft extract so obtained was again dissolved in methanol and saponin was allowed to precipitate in diethyl ether.

Determination of Foaming Index[11]:

From chemical tests, it was observed that, the aqueous extract and n-butanol extract contain the saponins. When an aqueous decoction was shaken the persistent foam was observed, hence there was need to measure the foaming index of the extract.

Determination of Ascorbic Acid Content[12]

Ascorbic acid reduces oxidation-reduction indicator dye, 2-6 dichlorophenol-indophenol to colourless solution. At end point, excess untreated dye is rose pink in acid solution. Vitamin is extracted and titration is performed in presence of m- phosphoric acid- acetic acid solution.

Determination of Hemolytic activity[13]

Red blood cells were obtained from healthy human volunteer. The blood suspension was prepared by finally diluting the RBC pellet to 0.5% in saline solution. A volume 0.5 ml of RBC suspension was mixed with 0.5 ml diluent containing different extracts (Butanolic, Methanolic and Aqueous extracts) of *C. adscendens* at conc. 5, 10, 25, 50, 100, 250, 500 and 1000 µg/ml in saline solution. The mixtures were incubated at 37ºC for 30 min., and centrifuged at 2000-2500 for 10 min. Free haemoglobin in the supernatants was measure spectrophotometrically at 412 nm. Saline and distilled water were used as minimal and maximal haemolytic controls.

RESULT AND DISCUSSION:

Very few studies have analysed the management, culinary use and health benefiting properties of food plants traditionally consumed among migrant communities. In traditional societies, nutrition and health care are interconnected and many plants are consumed as food in order to benefit health. The nutraceutical value of wild, semi-cultivated or neglected vegetables is regarded worldwide as an important area of the nutritional and phytotherapic research.

Table 1 Results of Quantitative Chemical Estimation of *C. adscendens*

Total Carbohydrate content of *C. adscendens*		13.05% w/w
Total protein content of *C. adscendens*		1.97 %w/w
Total Flavonoid content of *C. adscendens*	Butanolic extract	0.388%w/w
	Methanolic extract	0.321%w/w
Total saponin content of *C. adscendens*		8.2%w/w
Total ascorbic acid content of *C. adscendens*		0.17-0.23%w/w
Calorific Value		4.052 k cal/gm.
Foaming index		200

The qualitative phytochemical analysis indicates that *C. adscendens* contained steroids, triterpenoids, flavonoids, saponins and more polar compounds like sugars, proteins. Results of quantitative determination (Table .1) may confirm the big interest of the nutraceutical sciences in extracts of *Caralluma adscendens*, whose phytochemistry and phytopharmacology should be

investigated further. Saponins are a vast group of glycosides, widely distributed in higher plants. Literature data indicate that some saponins isolated from medicinal plants significantly reduce the blood glucose levels. Saponins also reduced the more harmful LDL-cholesterol selectively in the serum of rats and human subjects. Saponins, exerted the in vitro inhibitory effect on the free radical generating system-induced lipid peroxidation in the mouse brain and liver homogenates. *C. adscendens* also show presence of saponins which was confirmed by hemolytic activity (Figure 2).

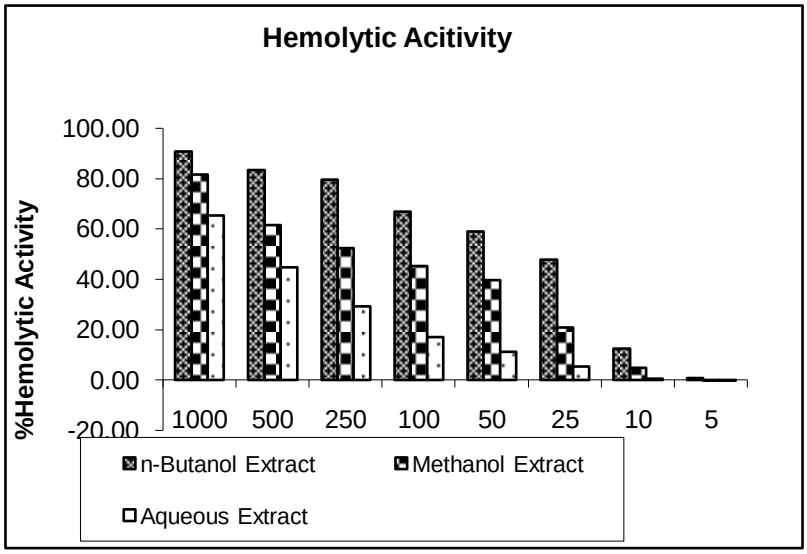

Figure 2 Hemolytic activity of various extracts of *C. adscendens*

CONCLUSION:

Caralluma adscendens is succulent plant made in to pickles as well as eaten raw. The plant is used by tribals as a famine food. It appears from the study that *C. adscendens* shows presence of flavonoids, saponins glycosides and triterpenoids. Hence attempt had been made to find out these phytochemical entities quantitatively.

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