CODEN(USA) IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

Available online at: http://www.iajps.com ***Review Article***

CHAMAECOSTUS CUSPIDATUS – A SHORT REVIEW ON ANTI DIABETIC PLANT

A. Naga Jyothi*, E. Priyanka, D. Eswar Tony, Rama Rao Nadendla
Department of Pharmacology
Chalapathi Institute of Pharmaceutical Sciences, Guntur, A.P 522 034

Abstract:
Chamaecostus cuspidatus is commonly known as fiery costus, it is a member of costaceae, and it is a newly introduced plant in India from south-central America. The leaves of this plant are used as a dietary supplement in treatment of diabetes mellitus. A number of researches have been carried out to evaluate the antidiabetic potential of plant. It has been proven to posses various pharmacological activities on diuretics, antioxidant, antimicrobial and anti-cancerous.

Key words: *insulin plant, antidiabetic activity, quercetin, spiral flag.*

Corresponding Author:
A. Naga Jyothi
Chalapathi Institute of Pharmaceutical Sciences,
Guntur.
Email: a.nagajyothi123@gmail.com

QR code

*Please cite this article in press as A.Naga Jyothi. et al , **Chamaecostus Cuspidatus – A Short Review On Anti Diabetic Plant,** Indo Am. J. Pharm. Sci, 2015;2(7).*

INTRODUCTION

Chamaecostus Cuspidatus (formely known as fiery costus, spiral flag, insulin plant) it is a species of herbaceous plant in costaceae family native to eastern brazil (states of bahia&spiritosanto).in India it is known as insulin plant due to its antidiabetic property. This plant belongs to the family costaceae which was first raised to the rank of family by Nakai on the basis of spirally arranged leaves &rhizome being free from aromatic essential oils. This family consists of 4genera &approximately 200 species. The genus costus is the largest family because it is having 150 species[1].

The synonyms of this plant are:

- Costus cuspidatus
- Costus igneus
- Globba cuspidatus
- Costus pictus

History

- Insulin plant was first found by the scientists NEES and MART.
- Specht & Steveson noticed that this taxa share significant morphological similarities such as appendaged green bracts and sheaths that grow beyond the stem node commonly covering the inter nodes entirely with other costus species [2].
- C.Cuspidatus is described as to be found in the Atlantic rain forest. It is Caulescent in habit.
- The Geographical Distribution is varied seasonally dry forest of south west Amazonia. C.Cuspidatus is found in central Atlantic forest. It has a distribution lying completely outside Amazonian domain.

SCIENTIFIC CLASSIFICATION

Domain: Eukaryota
Inherited blast name: monocot
Kingdom: Plantae
Subkingdom: Viridaeplantae
Phylum: Trahceophyta
Subphylum: Euphyllophytina
Infra phylum: Radiotopses
Class: Liliopsida
Sub class: Commelinidae
Order: Zingiberanae
Family: Costaceae
Sub family: Asteroideae
Tribe: Coreopsideae
Genus: Chamaecostus
Specific epithet: Igneus.

Fig 1: Leaves of Insulin Plants

Fig 2: Flowers of Insulin Plants

MORPHOLOGY

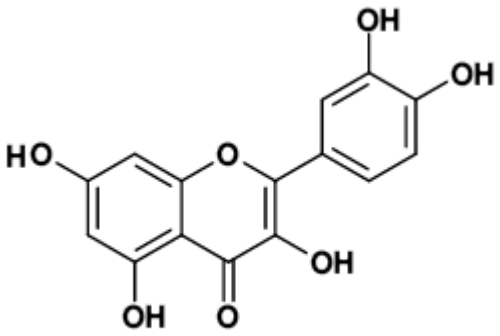
- It is a perennial, upright, spreading plant about 2 feet tall.
- It is a wonderful little ginger from South America with stunning orange coloured flowers (1-5 inch in diameter) found in central Atlantic rain forest.
- The leaves are simple, alternate. They are lanceolate, entire, and petiolate.
- It produces capituli of orange tubular flowers. The fruits are inconspicuous. The habit of this plant is sub terrestrial habit.

Cultivation and Propagation

- As this plant is perinnial. They prefer a either full sun or partial shade. It needs fertile soil &ample moisture. It is often planted near water.
- The substrate should be sandy loam. They can tolerate temperature only above at least 1° C.
- They are good for under planting. They reach the height up to 4-8 inches.
- This plant grows at the temperature zone of zone 9. It requires shade to part shade light.
- Propagation is by division of clumps, cuttings or by seperating the offsets or plantlets that form below the flower heads.

Phyto Chemical Constituents

- The phytochemical constituent of this plant is quercetin. It is a flavonoid. It was isolated as active principle from methanol extract of chamaecostus cuspidatus.



Quercetin

- It contributes the reduction in blood glucose level. It has been investigated that quercetin in doses of 10-50mg promotes normalization of level of glycemia & blood coagulation, increase in liver glycogen content; it reduces high blood serum concentration of cholesterol & low density lipo proteins seen in diabetes[3].
- Various phyto chemical investigations reveal the presence of carbohydrates, terpenoids, proteins, alkaloids, tannins and amounts of trace elements along with flavonoids.

Medicinal Uses

- C.cuspidatus is known as Insulin plant. As it is having the virtue of the promoting insulin by human body.
- Aqueous extract of this plant would prevent the formation of calcium kidney stones by the inhibitory effect on plant growth of calcium oxalate.
- The dry leaves of this plant show significant control over blood sugar level in laboratory rats.
- This plant is used for the reduction of post prandial blood sugar levels during fasting.
- It is now accepted and widely used as an Ayurvedic medicinal herb.
- It is possible to consume the leaves by drying and grinding the powder of the leaves.

Pharmacological Activities [4]

This plant has been proven to posses various pharmacological activities on diuretics, antioxidant, antimicrobial and anti cancerous.

Diuretic Effect

A study was carried out to measure the diuretic effect of an aqueous extract of *C. pictus* D. Done at doses of 100 and 200 mg/kg body weight and to compare it with the one induced by furosemide at 4 mg/kg. The results revealed that *C. pictus* induced a natriuretic effect similar to furosemide. The aqueous extract induced an increment in sodium and potassium clearance similar to the one obtained with furosemide, suggesting that it represents significant diuresis.

Anti Cancerous Effect

The ethanolic extract of leaves of *C. pictus* was found to have anti-proliferative and anti-cancer potential in *in-vitro* mammalian fibrosarcoma (HT-1080) cells. All the extracts of bark had potent anti-cancer properties against HT 29 and A549 cells.

Anti Oxidant Effect

An *in vitro* study of alcoholic extract of leaves of *C. mexicanus* showed moderate antioxidant activity. The antioxidant activities of leaves and rhizomes in methanol, aqueous, ethanol, and ethyl acetate extracts were assessed using different models like DPPH, β-carotene, Deoxyribose, superoxide anion, reducing power, and metal chelating assay at different concentrations. Leaves and rhizomes of *C. pictus* showed good antioxidant activity of about 89.5% and 90.0% when compared with standard BHT (Butylated Hydroxy Toulene) (85%) at a concentration of 400 µg/ml. Results obtained

revealed that methanolic extracts of both leaves and rhizomes of *C. pictus* possess higher antioxidant activity when compared with other extracts. In another study, methanolic leaf extract of *C. pictus* D. Don caused significant increase in superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, vitamin A, vitamin C, vitamin E and reduced glutathione, and thus, could be effective in reducing oxidative stress and free radical-mediated diseases. The antioxidant property of this plant may be due to the presence of phenolic substances. Methanolic extracts of flower and stem of *C. pictus* possess *in vitro* antioxidant activity against oxidative protein damage. Among the extracts tested for, chloroform extract of *C. pictus* D. Don bark possessed high antioxidant activity. Oral administration of ethanolic extract of *C. igneus* rhizome at 200 mg/kg body weight to diabetic rats for 30 days induced a significant antioxidant effect. The bioactive compound quercetin and diosgenin present in the plant exhibited antioxidant activity, which was sufficient to reverse oxidative stress in liver, pancreas, and kidney of diabetic rats as well as to stimulate glycolytic enzymes and control gluconeogenesis in diabetic animals.

Antimicrobial Effect

Methanolic extract of *C. igneus* showed maximum anti-bacterial activity against *gram-positive Bacillus cerus*, *Bacillus megaterium*, *Micrococcus leuteus*, *Staphylococcusn aureus*, *Streptococcus lactis*, and gram-negative strains *Pseudomonas aeruginosa*, *Escherichia coli*, *Enterobacter aerogenes*, *Klebsiella pneumoniae*, and *Salmonella typhimurium*. The isolated compound from the ethanolic extract of *Costus igneus* showed moderate anti-bacterial and anti-fungal activity against *Staphylococcus aureus*, *Eschericia coli*, and *Candida albicans*. Among the extracts of various parts of *C. pictus*, methanolic extracts of stem and flower exhibited maximum inhibitory activity on the growth of tested microbes, *viz*., *Shigella flexneri*, *Klebsiella pneumonia*, *Bacillus subtilis*, *and Escherichia coli* at the concentration of 150 µg/ml.

Toxicity Studies

Acute toxicity studies were studied with different doses of aqueous extract of *C. pictus* from 5, 10, 20, and 40 g/kg body weight. None of the doses of this extract produced mortality or any behavioral disorders. Acute toxicity studies revealed that the administration of aqueous extract 1 g/kg b.w/day for 30 days produced no effect on the general behavior and all the animals survived the test period.Administration of ethanolic extract of *C. igneus* leaves from 50 mg/kg b.w up to the dose of 5000 mg/kg b.w did not show significant toxicity signs during the first four hours and followed by daily observations for 14 days, and no mortality was also observed; the drug was found to be safe at the tested dose level of 5000 mg/kg body weight.

The methanolic extract of *C. igneus*, findings indicated toxicity at 250 mg/kg body weight.Further, in another investigation, palmitic acid was found to be the major component in the stem, leaf, and rhizome oils of *C. pictus*. Palmitic acid is found to induce degeneration of myofibrils in healthy adult rat cardiomyocytes, enhance LDL to HDL cholesterol ratio, and it was found to be the important precursor for the development of coronary heart diseases. So, the constant use of *C. pictus* leaves for diabetic treatment may cause serious cardiac diseases, and it is not recommended for the treatment.

CONCLUSION

As now a day's herbal medicine is interestingly growing field, the treatment of diabetes using the Chamaecostus cuspidatus plant have no side effects. The treatment of diabetes by these plants results in more beneficial effects. Identifying more number of medicinal plants to cure diabetes is highly necessary in this modern era. More investigations are needed to analyze the mechanism of action of the compounds and standardization of herbal drugs using models and this in turn would be useful to provide many links to develop various kinds of ant diabetic drugs in low costs.

REFERENCES

1. Specht, C.D. & D.W.Stevenson.2006. A new phylogeny – based generic classification of costaceae (Zingiberalis). Taxon 55(1): 153-163

2. Devi VD, Urroj A (august 2008). "Hypoglycemic potent of morus indica.L and Costus igneus.Nak. –A preliminary study". Indian J.Exp.Biol.46 (8): 614-616

3. Arun N, Udhaya A & Rajagaru P (December 2011). "In vitro root induction and studies on antibacterial activity of root 3 extract of Costus igneus on clinically important human pathogens." Journal of Microbiology and Biotechnology research. 1 (4):67-76

4. Jose B, Reddy L.J Analysis of essential oils of stems, leaves and rhizomes of this plant.