



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 5, May 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

An Overview of Medicinal Uses of Insulin Plant (*Costus igneus*)

Deepak D. Pardhe

Assistant Professor & Research Guide, Department of Botany, Sant Dnyaneshwar Mahavidyalaya, Soegaon,

M.S., India

ABSTRACT: *Costus igneus*, commonly known as insulin plant in India, belongs to the family Costaceae. Insulin plant has large fleshy looking leaves. The leaves are spirally arranged around the stem, forming attractive clumps arising from underground root stocks. The maximum height of the stem is about two feet. A number of researches have been carried out to evaluate the anti-diabetic potential of this plant. The present study is an attempt to collect and explore the different medicinal uses of insulin plant based on recent research activities.

KEYWORDS: Insulin plant, Anti-diabetic activity, Medicinal uses, *Costus igneus*

I. INTRODUCTION

Good nutrition, daily **exercise** and adequate sleep are the foundations of healthy living. A healthy lifestyle keeps us fit, energetic and at reduced risk for disease. The present-day knowledge about medicine considered to be a gift of ancient men to the mankind. The herbal medicines are in great demand in both developed and developing countries in primary health care because of their great efficacy and little or no side effects [1]. Most of the plant species are used in preparation of drugs [2]. According to Schippmann *et al.* 2002 [3] more than 50000 species are used for medicinal purposes worldwide, of which almost 13% are flowering plants. Over 8000 plant species are used in traditional and modern medicine in India (Planning Commission 2000) and 90-95% collection of medicinal plants are from the wild, of which more than 70% collection involves destructive and unscientific extraction. The World Health Organisation (WHO) estimated that 80% of the populations rely on traditional medicines, mostly plant drugs, for their primary health care needs in developing countries. Conservation and sustainable use of medicinal plants are issues on which immediate focus is required in the context of conserving biodiversity [4].

Insulin Plant, an herbaceous plant of Costaceae family is known for its herbal and medicinal properties. Insulin Plant is a native plant of tropical areas around the globe and especially of Asia. The leaves of this plant help in curing diabetes and maintaining the Blood sugar level and cholesterol. Insulin plant is a newly introduced plant in India from South and Central America. It is a perennial, upright, spreading plant reaching about two feet tall, with spirally arranged leaves and attractive flowers.

1.1 Morphology of Insulin plant: It is an upright, perennial shrub and is about two feet tall. Long branches are falling over the ground. Leaves are simple, alternate, oblong, twenty to twenty-five cm in length with several parallel thick veins. Soft, cylindrical, fleshy, pale brown rhizome is present. Strong tap root is also present which is wider at the top, subcylindrical in shape with light brown to pale, dark brown colour. At the top of the branches, orange flowers are present. Fruits are very small, green in colour.

1.2. Cultivation of the plant: It grows under full sun or partial shade. It needs fertile soil with heavy moisture and is often planted near water. Propagation occurs by the division of the clumps, cuttings, or by separating the offsets that form below the flower heads. It is cultivated in the coastal area, Uttar Kannada district of Karnataka and Tamil Nadu.



Fig 1. Insulin Plant (*Costus igneus*)

II. MEDICINAL USES OF INSULIN PLANT

The insulin plant has been reported with many activities. Among them, some are yet to be validated. The various plant parts are used for medicinal uses are leaf, stem, root, rhizome and whole plant also. Leaves are contributed to prominent hypoglycemic potential. The stem is majorly reported with anti-urolithiatic activity. Both stem and root have been shown significant antioxidant activity.

2.1. Diabetes Mellitus: Diabetes mellitus is a debilitating human disease. It is known to man since time immemorial. Diabetes is a major cause of morbidity and mortality, though these outcomes are not due to the immediate effects of the disorder. It is a disorder of carbohydrate metabolism characterized by the impaired ability of the body to produce or respond to insulin which is known as insulin resistance. Two main types of diabetes are found i.e., Type 1 and Type 2. Type 1 is a chronic illness manifested by the body's incapability of producing insulin due to the autoimmune destruction of the beta cells in the pancreas. Various symptoms like polyuria, polydipsia, polyphagia, and unexpected weight loss etc. are found. It is the most common form of diabetes in people who are under age 30, but it can occur at any age. 10% of people are diagnosed with Type 1 diabetes. In Type 2 diabetes, insulin resistance occurs. Nine out of ten people with diabetes have Type 2. It is more common in young adults, teens and children and accounts for roughly 90% of the population. It is found most often in people who are over 40 years old and overweight.

In the Indian System of Medicines, more than hundred medicinal plants were mentioned including folk medicines for the management of diabetes, which is effective either separately or in combinations. *Costus igneus* is such a type of herb that can be used as an alternative therapeutic agent with its availability, low or no side effects and cost-effectiveness. The leaves of this plant help in curing diabetes and maintaining the blood sugar level and cholesterol.

Bio-Active Compounds (Anti-Diabetic): *Costus igneus* contains various phytochemicals like flavonoids, alkaloids, terpenoids and it was traditionally used in India to control diabetes. The bio-components are present in various plant parts like in leaves, stems, rhizomes, etc. In leaves, Carbohydrates, triterpenoids, proteins, alkaloids, tannins, saponins, and flavonoids, etc. are present. Besides these, steroids and carbohydrate like roseoside, fatty acids like hexadecanoic acid, tetradecanoic acid, ethyl oleate, oleic acid, squalene are also present in leaves. In Stem, terpenoid compound lupeol and steroid compound stigmaterol are present. In Rhizome, Quercetin, diosgenin, a steroidal saponin etc. are available. In Root, Terpenoid, alkaloids, Tannins, etc. are available.

2.2. Anti-microbial Activity: Arun Nagarajan *et al.*, 2017 [5] investigated the antimicrobial activity of *Costus igneus* using its 100mg of root powder. Gram-negative Bacterial cultures like *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Salmonella* species, *Proteus vulgaris* were used in the study to determine the antibacterial activity.

2.3. Anti-urolithiatic Property: Kesavan studied the antiurolithiatic property of insulin plant using its aqueous extract of stem and rhizome and through the work found out that the plant extract was able to promote the formation of

hydroxyapatite (HAP) crystals and reduce the nucleation rate of CHPD crystals, a major component of calcium urinary stone. The growth of Calcium hydrogen phosphate dihydrate (CHPD) crystals has done by the single diffusion gel growth technique and the inhibitory effect of aqueous extracts of leaves, stems, and rhizome of *Costus igneus* on the growth of CHPD crystals has been investigated [6].

2.4. Anti-Inflammatory: Kripa Krishnan *et al.*, 2014 [7] studied the anti-inflammatory potential of β -amyirin isolated from the leaves of *Costus igneus* using rat model along with LPS-induced human peripheral blood mononuclear cells (hPBMCs) in vitro model. The differential fractionation methanolic extract (MEC) of *Costus igneus* leaves indicated a maximum percentage inhibition of paw edema at a given dose of 100 mg/kg body weight. The fractionation of MEC had been performed using various solvents such as chloroform, hexane, ethyl acetate, and butanol. The maximum beneficial effect was shown by chloroform extract (CEC) of MEC at a dose of 50 mg/kg bw.

2.5. Effect of *Costus Igneus* on Memory: Shalini Adiga *et al.*, 2014 [8] has evaluated the effect of *Costus igneus* on learning and memory in normal and diabetic-induced rats using passive avoidance test at doses of 250&500mg/kg ethanolic extract. For the induction of diabetes, a single dose of streptozotocin was injected (35 mg/kg) intraperitoneally. After a study period of 30 days, blood glucose level measured and rats were subjected to a passive avoidance test. The treatment with *Costus igneus* significantly reduced the blood glucose level in a dose-dependent manner (75.70% reduction for 500mg) in diabetic treated groups when compared to the diabetic control group. As summarizing the ethanolic extract of *Costus igneus* was able to produce a significant effect on learning and memory in diabetic rats when treated with at a dose of 500mg.

2.6. Antioxidant Activity: Ramya S. Ket *et al.*, 2015 [9] studied the effect of Methanol extract on antioxidant activity against *Klebsiella oxytoca*, *Pseudomonas fragi*, *Enterobacter aerogens* using various concentrations ranging from 100 μ g/mL - 500 μ g /mL. The antioxidant and radical scavenging activities of *Costus igneus* were assessed both Stem extract and Root extract. Root extract showed a high inhibition rate than stem extract. And among the stem and root extracts of *Costus igneus*, the total phenolic contents were found to be greater for roots extracts rather than the stem. Root extract also possesses a high amount of vitamin E.

2.7. Neuroprotective Role: Gupta D, *et al.*, 2018, [10] investigated the neuroprotective role of exogenous melatonin and insulin plant extract on the brain in streptozotocin-induced female diabetic rats. The extract showed a significant decrease of lipid peroxidation (TBARS) in brain tissue compared to the control group of rats. Melatonin as well as plant extract showed significant recovery to restore the brain complication induced by hyperglycemic effect caused by the diabetic condition and rescued the brain tissue by restoring the number of astrocytes and glial cells.

2.8. Hypolipidemic Activity: Pazhanichamy Kalailingam *et al.*, 2011 [11] investigated the antihyperglycemic and hypolipidemic activities of methanol extract of *Costus igneus* rhizome (MECiR) in streptozotocin (STZ) induced diabetic albino rats. MECiR has given at doses of 100, 200 mg/kg orally as a single dose per day to diabetes-induced rats for a period of 30 days. The results indicated that fasting blood glucose, serum total cholesterol(TC), triglycerides(TG), low-density lipoprotein(LDL), very low-density lipoprotein(VLDL), levels were significantly decreased.

III. CONCLUSION

The *Costus igneus* is an important medicinal herb with various pharmacological effects. The studies have proved that insulin plant possesses many important phytoconstituents such as conjugated flavonoids, flavones, flavonols, catechin and catechin derivatives, chlorophylls a and b, resinoids, essential oil, and alkaloid named saussurine, insulin and resin etc and these compounds found to be responsible for various pharmacological properties such as antidiabetic effect, antiproliferative effect, antimicrobial activity, antiurolithiatic property, anti-inflammatory potential, the effect on memory, antioxidant activity, neuroprotective role, hypolipidemic activity etc. Further more research is required to make the treatment more assuring, reliable, with fewer side effects for the welfare of mankind in the future.



REFEENCES

1. Narula A, Srivastav PS and Rangaswamy NS, 2000. Invitro culture studies on *Dioscorea species*, *J.Trop.Med.Plants*, 1:60-74.
2. Nautiyal S, Kumar R & Husen A, 2002 Thoughts & reflection status of medicinal plants in India: Somelatest issues *Ann.for bot.* 10(1):181-190.
3. Schippmann, U., D.J. Leaman and A.B. Cunningham, 2002. Impact of cultivation and gathering of medicinal plants on Biodiversity: Global trends and issues. In (FAO). Biodiversity and Ecosystem Approach in Agriculture, Forestry and Fisheries.
4. Kshirsagar A. A., Pawar SM, Patil NP and Mali VP,2012. Diversity of medicinal plants in Gautala sanctuary of Kannad, district Aurangabad (MS) India. *Bioscience Discovery*, 3(3): 355-361.
5. Nagarajan A, Arivalagan U, Rajaguru P. In vitro root induction and studies on the antibacterial activity of root extract of *Costus igneus* on clinically important human pathogens. *Journal of Microbiology and Biotechnology Research*. 1, 2017 Mar 17, 67-76.
6. F. Mathew, B. Varghese, 2019, A review on medicinal exploration of *Costus igneus*: the insulin plant, *Int. J. Pharm. Sci. Rev.* 54 (2) 2019: 50-57.
7. Krishnan K, Mathew LE, Vijayalakshmi NR, Helen A. Anti-inflammatory potential of β -amyrin, a triterpenoid isolated from *Costus igneus*. *Inflammopharmacology*. 22, 2014 Dec 1, 373-385
8. Adiga S, Chetty S, Reddy S. Evaluation of The Effect of *Costus igneus* on Learning and Memory in Normal and Diabetic Rats Using Passive Avoidance Task. *International Journal of Pharmacy and Pharmaceutical Sciences*. Volume 6, 20 Feb 2014, 835-838.
9. Ramya Urs S.K and Jyoti Bala Chauhan. Phytochemical Screening, Antimicrobial Activity and Antioxidant Activity of *Costus igneus*. *European Journal of Molecular Biology and Biochemistry*. 2, 2015, 93-96.
10. Gupta D, Rai S, Hajam YA et al. Neuroprotective Role of Exogenous Melatonin and Insulin Plant (*Costus igneus* nak.) Extract on Brain in Streptozotocin-Induced Diabetes in Female Rat. *Research & Reviews: A Journal of Pharmacognosy*. 5, 2018, 33-41.
11. Kalailingam P, Sekar AD, Samuel JS, Gandhirajan P, Govindaraju Y, Kesavan M, Kaliaperumal R, Tamilmani E. The efficacy of *Costus igneus* rhizome on carbohydrate metabolic, hepatoprotective and antioxidative enzymes in streptozotocin-induced diabetic rats. *Journal of Health Science* Vol.57, 2011, 37-46.



INNO  **SPACE**
SJIF Scientific Journal Impact Factor

**Impact Factor:
7.512**

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details