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## *Costus igneus* : A Pharmacological Update



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### ABSTRACT

Medicinal plants are the backbone of the indigenous system of medicine; it has been used by all cultures as a source of medicine. *Costus igneus* is a plant with a vivid variety of pharmacological activities and it is from the family costaceae. The plant is also known as insulin plant or spiral flag. The anti-diabetic potential of the plant is evaluated and are used in India to control diabetes. The plant as a whole or different part of the plant like root, stem, leaves, flowers, rhizomes is used for proving different pharmacological activities.



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## INTRODUCTION

Herbal medicine is also known as phytotherapy or phytomedicine has played a significant role in maintaining health and improving the quality of human life. They are used as prophylactic, treatment and curative agent. These herbal remedies are undesirable and their lower adverse effects and toxicity levels have also potentiated their uses. Efforts to monitor and regulate Ethnopharmacological studies related to herbs are underway.<sup>1</sup>

*Costus igneus* is a perennial plant of the family Costaceae. There are about 200 species in the family costaceae. Traditionally whole plant and its different parts are evaluated for various pharmacological activities. It is an upright spreading plant which reaches up to a height of 2 feet. It has leaves which are simple, entire, alternate and oblong with parallel venation. The stems are falling over and lying on the ground. They have attractive yellow flowers which bloom in the warmer months. The fruits are unostentatious and not showy. These plants are tap-rooted and are subcylindrical in shape. They also have soft, cylindrical, fleshy rhizomes which grow about 20-40cm. They are usually propagated by stem cutting method.<sup>2</sup>

Phytochemical studies related to *Costus igneus* plant has revealed the presence of alkaloids, saponins, carbohydrates, steroids, triterpenoids, proteins and other trace elements like potassium, calcium, manganese, copper, zinc. It is well known for its anti-diabetic activity. Other than this it has many other proven pharmacological activities like antioxidant, hypolipidemic, anticancer, antimicrobial, diuretic, antiurolithic activity. The leaves of these plants are traditionally used by the folks of Kolli hills, Tamil Nadu.<sup>3</sup>

## REVIEW OF LITERATURE

### • Anti-diabetic Activity

**Kalailingam, et al (2011)**<sup>4</sup> conducted a study on *costus igneous* rhizomes for the evaluation of the anti-diabetic activity. The study was conducted on streptozotocin-induced diabetic rats. Streptozotocin (STZ) selectively destroys the insulin-secreting pancreatic  $\beta$  cells and are very useful for evaluating hypoglycemic agents. Based on the study it could be concluded that the *costus igneous* extract has significantly lowered the blood glucose level by increasing the insulin secretion. This, in turn, has activated the glucose catabolic enzyme glucokinase and also increased the utilization of glucose. The anti-diabetic effect may be due to the presence

of tannins, diosgenin, phlorotannin, flavonoid (quercetin), steroids, cardiac glycoside and terpenoids in the plant extract.

**Bhat Vishnu, et al (2010)**<sup>5</sup> conducted a study on *costus igneus* leaf extract for the evaluation of anti-diabetic activity on alloxan induced diabetic rat model. The ethanolic leaf extract of the plant has significantly lowered fasting blood serum glucose in diabetic rats and this effect may be due to improving glycemic control mechanism and increased secretion of insulin from the remnant pancreatic  $\beta$  cells.

- **Hypolipidemic Activity**

**Kripa Krishnan, et al (2011)**<sup>6</sup> conducted the study for the evaluation of the hypolipidemic activity of methanolic extract of *Costus igneus* leaves in diabetic rats. The experiment was conducted on streptozotocin-induced diabetic rats. Dyslipidaemia most often coexists with a diabetic condition, this is due to the increased mobilization of fatty acid from the peripheral tissues, increased action of glucagon and catecholamine (lipolytic hormones) on fat depots and decreased activity of HMG CoA reductase enzyme. This study demonstrates that the methanol extract of *costus igneus* is able to alter the lipid metabolism in serum and tissues, increases the activities of lipoprotein lipase in adipose tissue and heart tissue and HMG CoA reductase enzyme was raised to normal levels.

- **Antiuro lithic activity**

**M.Manjula, et al (2012)**<sup>7</sup> Conducted the study on ethanolic and aqueous extract of *Costus igneus* for the evaluation of the antiuro lithic activity. The effect was studied in male albino Wistar rats. Ethylene glycol feeding resulted in hyperoxaluria as well as increased renal excretion of calcium and oxalate. From the study they concluded that treatment with the aqueous and ethanolic extract of *Costus igneus* significantly lowered the calcium and oxalate deposition, they also studied the effect of isolated compounds lupeol and stigmasterol on calcium oxalate urolithiasis.

- **Anti-inflammatory activity**

**Kripa Krishnan et al, (2014)**<sup>8</sup> conducted a study with *costus igneous* plant for the evaluation of the anti-inflammatory potential of a terpenoid,  $\beta$ -amyryn isolated from the leaves of the plant. An *invitro* CPS- induced human peripheral blood mononuclear cells model and

carrageenan-induced rat model was used for the study. The methanolic extract of the plant at a concentration of 100mg/kg body weight has shown a maximum inhibition of paw edema. The anti-inflammatory effect of the methanolic extract of *Costus igneus* may be due to the inhibition of cyclooxygenase (COX), Lipooxygenase (LOX), Myeloperoxidase (MPO) and Nitric oxide synthase (NOS) activities in monocytes. The effect of the plant extract was more pronounced than the standard drug diclofenac (20mg/kg body weight). The isolated  $\beta$ -amyrin showed a dose-dependent decrease in paw edema. At a dose of 100 $\mu$ g, it has produced a decrease of 97% carrageenan-induced paw edema.

- **Hepatoprotective activity**

**Pazhanichammy Kallailingam, et al (2011)**<sup>9</sup> conducted a study on *costus igneus* rhizome for determining the hepatoprotective activity. The ethanolic extract of the plant was administered at a dose of 100 or 200mg/kg body weight of the diabetic rat for 30 days. In the diabetic rats, there was a significant increase in the levels of hepatic enzymes like aspartate transferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP). The use of the *costus igneus* rhizome extracts on test animals has lowered the levels of AST, ALT to near normal values. The effect on carbohydrate metabolic enzymes and ant oxidative enzymes was also determined in this study.

- **Anticancer Activity**

**Deva kalidoses, et al (2017)**<sup>10</sup> conducted the *in vitro* study on *costus igneus* plant for the evaluation of the anticancer activity. *In vitro* cytotoxicity study was conducted in Ehrlich Ascites carcinoma cell lines and Dalton's lymphoma Ascites cells. Anticancer activity was evaluated by using Trypan blue exclusion, LDH assay, and MTT assay. The percentage viabilities were calculated and from the result, it was concluded that the ethanol extract of *Costus igneus* has potential anticancer activity.

- **Antioxidant activity**

**Nimmy Chacko, et al (2018)**<sup>11</sup> conducted *in vitro* evaluation of Antioxidant potential of ethanol extract of *Costus igneus* leaves. The reducing capacity of the extract was compared with ascorbic acid for the reduction of  $Fe^{3+}$  to  $Fe^{2+}$  and the extract showed an increase in reducing power compared to ascorbic acid at a concentration of 16  $\mu$ l/ml. This antioxidant potential may be due to various mechanisms like prevention of chain initiation, prevention of

continued hydrogen abstraction, decomposition of peroxide, and binding of transition metal ion catalysts, reductive capacity, and radical scavenging activity. The superoxide radical scavenging activity and DPPH assay were conducted to estimate the radical scavenging activity.

- **Antimicrobial Activity**

**Nirmala Babu, et al (2016)**<sup>12</sup> conducted a study on leaves of *Costus igneus* for the evaluation of the antimicrobial activity. The antimicrobial activity was tested against gram +ve and gram –ve bacterial and fungal strains which include *E.coli*, *Staphylococcus aureus*, *Candida parapsilosis*, *Salmonella typhi*, *Bacillus subtilis*, *Aspergillus niger*, *Candida albicans*. The antimicrobial activity was determined by disc diffusion method and it was indicated by a zone of inhibition. From this study it was concluded that the leaf extract of *Costus igneus* have antimicrobial potential and action was more against *Bacillus subtilis* and *Candida parapsilosis* at a lower concentration.

## SUMMARY

*Costus igneus* is an important medicinal plant with a wide range of medicinal use in folk and traditional therapeutic system. This review presents a detailed review of the various pharmacological uses of the plant. The different range of phytochemicals present in the plant parts is responsible for the extended range of pharmacological activities. This review supports that the *costus signals* is a promising drug candidate for future drug development.

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