

Caralluma fimbriata: AN OVERVIEW

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ABSTRACT

The claimed effect is "helps to reduce body weight". Pregnane glycosides are plant steroids, which are common to all the *Caralluma* genus, and various congeners are found in all *Caralluma* species. The species of *Caralluma* found in India are edible and form part of the traditional medicine system of the country. An investigation was carried out to find out the effect of *Caralluma fimbriata* extract on appetite, food intake, Diabetic and anthropometry in adult Indian men and women. Phytochemicals including phenolics, flavonoids, tannins, proanthocyanidins and various plants or herbal extracts have been reported to be Radical Scavengers and inhibitors of Lipid Peroxidation.

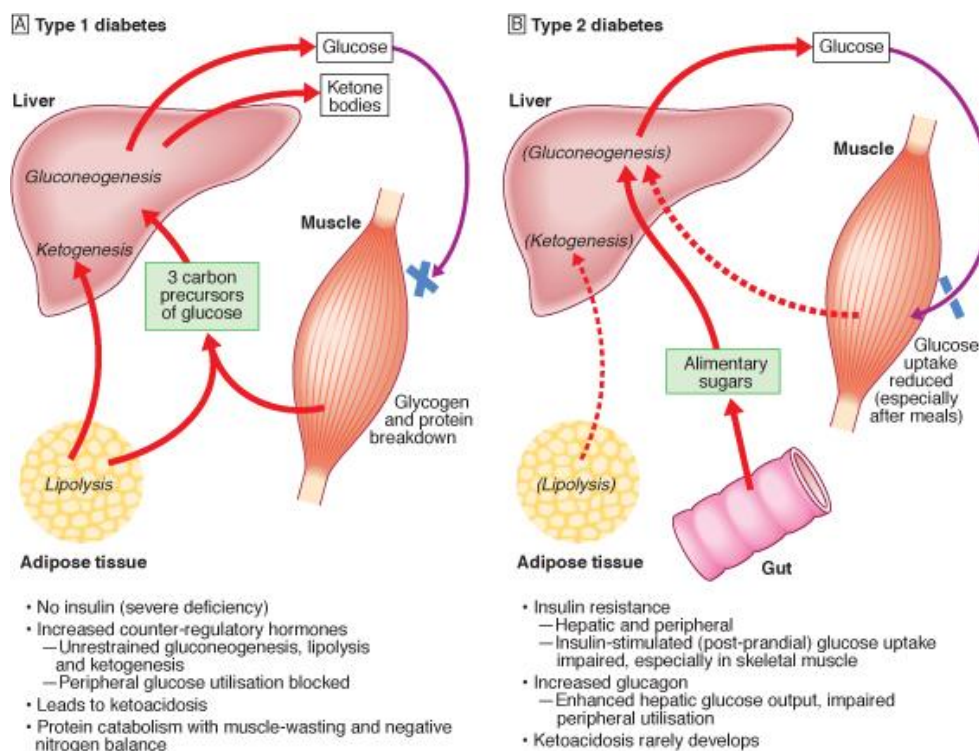
KEY WORDS

Caralluma Fimbriata, Obesity, Safety, Weight loss.

INTRODUCTION

Diabetes mellitus is a global health problem throughout the world [1]. Which is characterized by derangement in carbohydrate, fat and protein metabolism, affecting nearly 10% of the population [2]. In the year 2000, 150 million people world-wide had diabetes, and this is expected to double by 2010. This global pandemic principally involves type 2 diabetes, and is associated with several contributory factors such as increased longevity, obesity, unsatisfactory diet, sedentary lifestyle [3]. Globally, type 1 DM affects considerable percentage of population and it leads to morbidity and mortality of the diabetic patients. The plasma lipids usually raised in Diabetic which causes risk factor for Coronary Heart disease [4].

The treatment of Diabetic mellitus is based on oral hypoglycaemic agents and insulin [5]. Lack of insulin affects the metabolism of carbohydrate, protein and fat, and causes a significant disturbance of water and electrolyte homeostasis, the actions of insulin are also impaired by insensitivity of target tissues [3]. The oral hypoglycaemic agents currently used in clinical practice have characteristic some serious side effects. In both type 1 and type 2 diabetes, the actions of insulin are also impaired by insensitivity of target tissues. While this is a fundamental defect in type 2 diabetes, hyperglycaemia can also reduce insulin secretion by the effect of glucose toxicity on beta cell function. The pathophysiological processes in type 1 and 2 diabetes are shown in **Fig: [3]**



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Hence, there is a need to search for newer anti-diabetic agents that retain therapeutic efficacy and reduce the side effects and also risk factor like hyperlipidemia, hypertension and so on [6]. there is an increased demand by patients to use natural products with antidiabetic activity. Hence, today there is need for finding the alternatives which will minimize the side effects and the cost of drug. Therefore it become necessary to make use of vast reserves of plant origins for medical purposes which will help to search effective as well as safer drug remedy for diabetes mellitus.

Caralluma fimbriata plant having synuonym *caralluma ascendens* which belongs to family Asclepiadaceae. It is wisely found in Africa, the Canary Islands, India, Arabia, southern Europe, Afaganisthan. *Caralluma fimbriata* is a dry herb growing in the dry parts of the india. *Caralluma fimbriata*, a traditional Indian “famine food” with no history of adverse effects[7].The key phytochemical constituents of the herb are

pregnane glycosides, flavone glycosides, megastigmane glycosides, and saponins. Some of the active components present in this plant are CaratubersideA, CaratubersideB, Bouceroside I-X, Tomenkogenin, Sitosterol etc [14]. The plant is found to have anti-oxidant activity hence it can be used in the treatment of diabetes mellitus. Fresh leaf extract of *Caralluma fimbriata* has been reported to reduce blood glucose in normal and alloxan diabetic rabbits. In this study the prolonged effect (up to 14 day) of the ethanolic extracts of whole plant of *Caralluma fimbriata* in fasting blood glucose (FBG) and biochemical parameters such as serum total cholesterol (TC), LDL, HDL, creatinine, urea, and alkaline phosphatase were studied in alloxan induced diabetic rats. This study was designed to examine the hypoglycemic and antilipidemic effects of *Caralluma fimbriata* s on alloxan-induced Diabetes Mellitus based on the local uses of the plant for the treatment of diabetes mellitus.

MECHANISM OF ACTION

"*Caralluma fimbriata* addresses three key underlying issues related to weight gain: an inability to burn fat, constant hunger and poor muscle tone. *Caralluma fimbriata* contains pregnane glycosides, a phytochemical that blocks the enzyme citrate lyase. When this enzyme's activity is stopped, your body cannot produce fat [8].

Further, *Caralluma fimbriata* also blocks another enzyme called Malonyl Coenzyme A. By blocking this enzyme, fat formation is further Blocked and the body is forced to burn its fat reserves. Thus, the rate of fat is losing by the body.

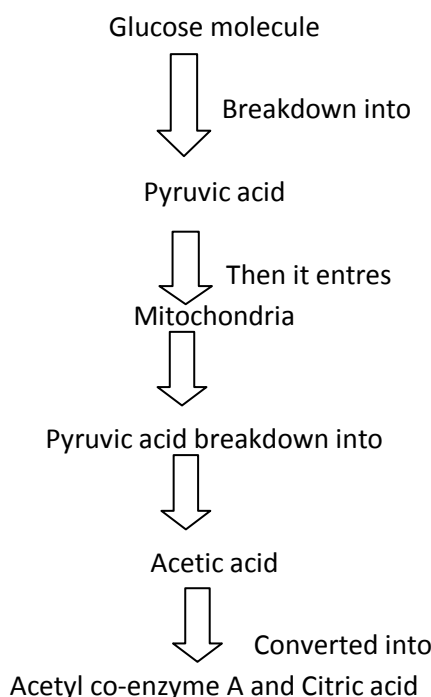
Proposed mechanism of action:

Kreb's cycle or Citric acid cycle:

Mitochondria are known as body's powerhouse as they generate energy to the body from the

food we eat. Kreb's Cycle or the Citric Acid Cycle, takes place in the mitochondria, which are found in the cells of most living beings. The body obtains energy when glucose molecules are broken down through a process called catabolism. This process is coupled with the synthesis of a high-energy molecule called ATP (adenosine tri-phosphate) which provide chemical energy to the body.

Glucose is broken down into a compound called pyruvic acid these enters the mitochondria. then after Pyruvic acid is broken down to acetic acid and ultimately, it is converted to acetyl co-enzyme A and citric acid, hence the name Citric Acid Cycle. During this cycle, ATP is formed. The Krebs Cycle is a critical pathway for the body because it generates ATP, which in turn generates the energy the body needs for its day-to-day activities. [9]



HOW FAT IS FORMED?

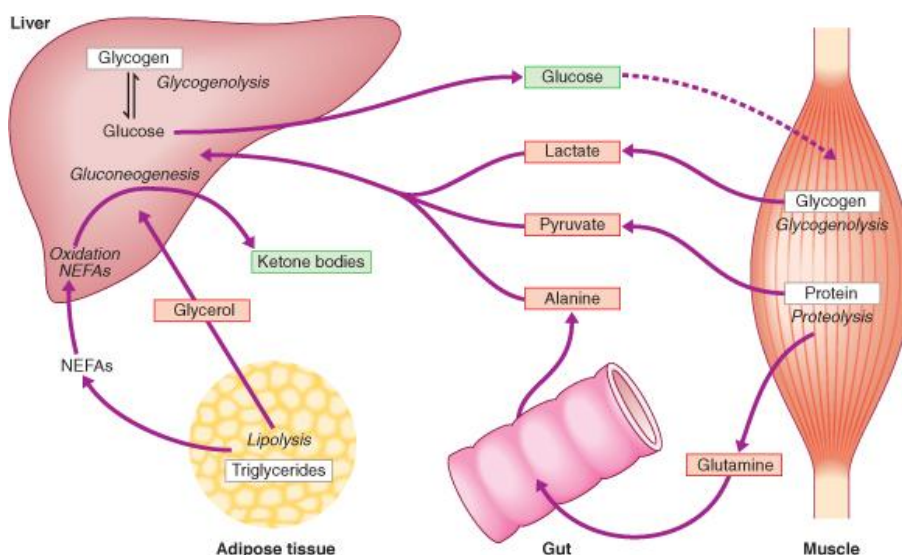
The Kreb's Cycle described above, generates energy from glucose. When glucose rises, fat is formed in adipose (fat) tissue and in the liver

through a process called gluconeogenesis. Fat is formed after the Kreb's Cycle and is synthesized in the form of fatty acids. The

basic building block of fatty acids is Acetyl coenzyme A, which is mentioned above.

Now, for the formation of Acetyl Co A, a vital enzyme called citrate lyase is required. If this enzyme is blocked, then fat cannot be made by the body. The liver produces glucose by gluconeogenesis and glycogen breakdown. The main substrates for gluconeogenesis are shown

in **Fig:** Insulin suppresses gluconeogenesis and promotes glycogen synthesis and storage. It promotes the peripheral uptake of glucose, particularly in skeletal muscle, and encourages storage (as muscle glycogen) and protein synthesis. It also promotes lipogenesis and suppresses lipolysis. These processes are reversed in the absence of insulin.



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Fig: Major gluconeogenic substrates and their tissues of origin

the principles present in the widely consumed Indian food plant *C. fimbriata* extract (CFE) suppress appetite, and provide antiobesogenic and metabolic benefits. The data substantiate CFE's reported anorexigenic effects. CFE treatment also gives protection against atherogenesis. CFE also possesses antiobesogenic and antiatherosclerotic properties [10].

Safety:

Entire history of *Caralluma fimbriata* shows to be a little or no adverse effect. It is commonly used as vegetable in several parts of India. It also finds use today as an appetite suppressant and famine food during times of famine, in the semi-arid regions of India [15]. There were a mild gastrointestinal upset, which may have

been caused by the gelatin capsules, rather than the extract itself as some subjects in the placebo group complained of identical symptoms. The Department of Pharmacology, St John's Medical College in Bangalore, India testing the safety of *Caralluma fimbriata*. Doses of 2g/kg body weight and 5g/kg body weight were given to both male and female. After the observation of 14 days all animals were survive at very high dose. Thus, *Caralluma fimbriata* was not toxic [15].

Clinical trials of *Caralluma fimbriata* extract:

1. USE OF *Caralluma Fimbriata* EXTRACT TO REDUCE WEIGHT [11]

Health and Clinical Research

A double-blind, placebo-controlled, randomized clinical trial on *Caralluma fimbriata* extract was done on 50 human subjects. following are the observations made in the trials-

- *Caralluma fimbriata* extract was well tolerated.
- *Caralluma fimbriata* extract shows minimal side effect
- *Caralluma fimbriata* extract shows significant weight loss.

2. USE OF *CARALLUMA FIMBRIATA* EXTRACT FOR OBESITY. [12]

This study was conducted 26 overweight patients. 19 on active compound and 7 on placebo compound followed for 4 weeks. Following are the observations made in the trials-

- *Caralluma fimbriata* Extract was well tolerated
- *Caralluma fimbriata* Extract has shown long safety with little adverse effect.
- *Caralluma fimbriata* shows significant reduction in body weight.

Caralluma fimbriata-Safety pharmacology

the acute oral toxicity of *Caralluma fimbriata* Extract by oral administration in male and female Wistar rats is carried out by dose 2g/kg body weight and 5g/kg body weight. observation is done for 14 days. The symptoms subsided within a week in all subjects [13]

All animals were well survive. thus, *Caralluma fimbriata* is safe as it does not show any toxic effect. *Caralluma fimbriata* extract did not produce signs of toxicity at very high doses of 5 g/kg and it could be classified in the classification of : LD50 more than 5 g/Kg.

Clinical tests:

The following parameters were estimated-

- **Fat analysis:** Determines the amount of fat in body

- **Blood chemistry and systemic function test:** total cholesterol, LDL, HDL, triglyceride Renal function tests comprising serum creatinine and blood urea Liver function tests comprising total protein. these tests were done to ensure any adverse effect of *Caralluma fimbriata* extract on systemic function of body.
- Cardiovascular function: Blood pressure, ECG
- Appetite suppressant: Hunger, Urge of eat, fullness.

CONCLUSION:

From the clinical trials and clinical test it is concluded that extract of *caralluma fimbriata* demonstrate the reduction of weight circumstance, reduction in body weight, reduction in fat. Extract of *Caralluma fimbriata* also shows appetite suppressant action.

Extract of *Caralluma fimbriata* is capable of decreasing appetite, prevent deposition of fats and reduce obesity. This is because, *Caralluma fimbriata* blocks the formation of 2 enzymes i.e Acetyl Co-Enzyme A and Malonyl Co-Enzyme A, which are the building blocks of fat synthesis. *Caralluma* inhibits fat synthesis also increase burning of fats (15).

Caralluma fimbriata is believed to act directly on the appetite control center of your brain, specifically the hypothalamus. When you are hungry, your hypothalamus sends your brain a message that you need to eat. Once you do eat and your belly is full, the hypothalamus then tells your brain you've had enough and to stop eating (15).

ACKNOWLEDGEMENT:

We are thankful to Tatyasaheb Kore college of Pharmacy, Warananagar.

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