



A REVIEW

Role of edible cactus *Caralluma fimbriata* as a potent therapeutics

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Abstract : The plant *Caralluma fimbriata* is one of the edible cactus belong to the family Apocyanaceae. The plant is used by the common people and the Indian tribes to suppress appetite and enhance endurance. *Caralluma* species are being consumed as vegetable as raw or cooked in the form of pickle or chutney in Kerala, Andhra Pradesh, southern and western parts of India. Some of the constituents like pregnane glycoside, flavonoglycosides, saponins, flavonoids of the plant elicit numerous therapeutic effects. *Caralluma* species are known for its therapeutic effect such as hunger suppressant, anti diabetic and anti obesity, anti-inflammatory, anxiolytic, analgesic, anti oxidant, anticancerous activity. More studies need to be carried out on *Caralluma* species to exploit its medicinal properties.

Key Words : Edible cactus, *Caralluma fimbriata*, Potent therapeutics

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INTRODUCTION

Caralluma fimbriata is an erect branched succulent herb belongs to the family Apocyanaceae. It is used as vegetables in southern and Western parts of India. Consumption of *Caralluma* species is a potent medication for obesity. *C. adscendens* var. *fimbriata* is used by tribal people in middle India as an appetite suppressant (Lawrence and Choudhary, 2004 and Kuriyan *et al.*, 2007). It is known as appetite suppressor, thirst quencher and also known as famine food (Dhayalan *et al.*, 2011). *C. fimbriata* are used as therapeutic agent to cure many diseases like diabetes, leprosy, paralysis,

malaria, ulcer, rheumatism.

Appetite suppressant :

Appetite suppressants are diet supplements or drugs which suppress appetite which causes to consume less food eventually resulting in weight loss. Mainly appetite suppressant restricts the food intake by acting on the neurotransmitters of the central nervous system. Synthetic drugs that act on serotonin receptors, monoamines system, γ -amino butyric acid, cannabinoid receptors, peptides etc are widely used as appetite suppressants. Liraglutide (Saxenda), Naltrexone, Phentermine, are some of the FDA approved synthetic

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appetite suppressant drug (Singh *et al.*, 2020). In view of adverse effects such as constipation, dysgeusia, paresthesia, depression, anxiety and insomnia (Allison *et al.*, 2012 and Gadde *et al.*, 2011) caused by the use of synthetic drugs (example-combination of Phenteramine and topiranate), to overcome these side effects there is constant attempt to assess natural bio-active compound for its appetite suppressant activity (Gul *et al.*). Naturally occurring herbs and plants such as fenugreek, green tea extract, ginger, coffee, almonds, Yerba mate, act as appetite suppressants (Singh *et al.*, 2020).

Liu (2013) and Huang *et al.* (2016) have described bio-active compounds as plant derived secondary metabolite compounds that are non-nutrients and have an effect on the humans (Liu, 2013 and Huang *et al.*, 2016). The bio-active compound pregnane glycosides extracted from an African Hoodia plant, are known appetite suppressors (Lawrence and Choudhary, 2004).

The phytochemical pregnane glycoside present in of *C. fimbriata* extract suppresses the hunger by interfering with the signaling mechanism of hypothalamus. As a result of this the individual feels the stomach is full without consumption of food (Saboo and Zaveri, 2011). A research article by Ambadasu *et al.*, (2013) investigated that *C. fimbriata* extract (100mg/kg/day) for appetite suppressing activity on Cafeteria induced rats showed reduction in the food intake. Thus CF is a potent appetite suppressor. There is less practical evidence on human trials (Ambadasu *et al.*, 2013).

Anti obesity activity:

Obesity is the excessive body fat accumulation due the disparity between the intake calories and expended calories than the normal range (Malik *et al.*, 2013). Obesity is one of the major problem in developed and under developed countries. It is caused due to genetic factors, mechanical life style, unbalanced diet, lack of exercise (Malik *et al.*, 2013). According to WHO obesity is becoming one of the major health issues affecting the adult population. Over weight individuals are associated with the many complicated disorders like cardiovascular, Diabetes, hypertension osteoarthritis and certain cancers (Bhattarai, 2018). Weight loss helps to reduce the risk factor. Many strategies are employed to reduce the body weight like life style, balanced diet and physical exercise but it does not give much effect. For weight loss various treatments such as medication, routinely diet, use of appetite suppressants, bariatric surgery etc. has been

constantly in used. These treatments place a major adverse effects of individuals. To overcome these problems treatment for obesity is replaced with herbal formulations (Arora *et al.*, 2015).

Phytochemicals such as Pregnane glycosides, flavone glycosides, flavonoids, etc. present in *C. f. extract* restricts the synthesis of lipids by blocking an enzyme citrate lyase, involved in lipogenesis and Pregnane glycosides prevents the proliferation and differentiation of adipocytes, thereby hindering the formation of fat in the body (Sharma, 2013). A report by Jnanesha and Kumar (2018) states that lipid inhibition, adipogenesis and thermogenesis regulation are the mechanisms involved in the obesity management by *Caralluma fimbriata* extract (Jnanesha and Kumar, 2018). Studies by Ambadasu *et al.* (2013) on Cafeteria diet induced rat Model showed that variation in the lipid profile and reduction in body weight (anti-obesogenic effect) by treating with CF extract (Ambadasu *et al.*, 2013).

Anti diabetic activity :

Diabetes is one of the chronic health problems observed worldwide in all age groups. Diabetes is also called as Diabetes mellitus, characterized by high blood glucose level due to deformities in insulin secretion or improper reaction of body cells to insulin action or both leading to abnormalities in metabolism of lipid, carbohydrate and proteins (Lal 2016 and American Diabetes Association, 2013). There are 3 forms of diabetes, Type 1 is insulin dependent diabetes caused by an autoimmune condition where one owns body cells damages β -cells of pancreas, preventing them to produce adequate amount of insulin. Type II is non-insulin dependent diabetes characterized by insensitive receptors present on hepatocytes, muscle cell and adipocyte (Dubey *et al.*, 2019). Gestational diabetes is a type of diabetes diagnosed in females during late pregnancy. This results in high levels of glucose in the blood of pregnant women due to lack of insufficient insulin secretion (Lal, 2016). Cancer, retinopathy, neuropathy, cardiovascular diseases, renal dysfunction, etc. are some of the adverse health problems associated with diabetes mellitus (Hansen *et al.*, 2012 ; Sobngwi *et al.*, 2012 and Chaturvedi *et al.*, 2018). Due to the adverse effect of oral English medicines which have hypoglycemic activity, people are attracting towards the use of herbal medicines or formulations. A studies by Latha *et al.* (2014). reveals that the Methanolic extract (100mg/kg and 200mg/kg)

of *caralluma fimbriata* treated albino rats shows the control of glucose level by the sufficient secretion of insulin from the Beta cells of pancreas and increased body weight and decreased plasma glucose level, while the rats induced with the streptozocin shows the damage to the islets of Langerhans of pancreatic beta cells decreases the body weight and increased plasma glucose level (Latha *et al.*, 2014).

Studies reveal that antihyperglycemic effect may be due to action of Polyphenols (Bellamakondi *et al.*, 2014). The *Caralluma fimbriata* extract restrain the enzyme action of alpha-amylase, alpha glucosidase and carbohydrate digestion (Ashwini and Anitha, 2017). To study the *in-vivo* anti-diabetic effect of ethanolic and aqueous extract of *Caralluma fimbriata*, Patil *et al.*, used alloxan monohydrate induced animal models of diabetes mellitus. The blood glucose level in diabetic rats treated with ethanolic extract (500mg/kg) and aqueous extract (500mg/kg) of *C.f* showed reduced glucose level when compared to control group at different time intervals. Thus, *C. fimbriata* can be used as an anti-diabetic herbal drug (Ajit *et al.*, 2017).

Anticancer activity :

Cancer is a disease characterized by the development of abnormal cells that divide uncontrollably and spread into surrounding tissue. Ethanolic extract of *Caralluma fimbriata* at the concentration of 100 – 300µg/ml at 24hrs showed the dose dependent cytotoxic effect on K B mouth Cell lines, the cytotoxicity was measured by MTT Assay against Cyclophosphamide a positive control. The cytotoxic potentiality is increased with the increased concentration of *C. fimbriata* extract (Sahasini *et al.*, 2019). Priya *et al.* (2014) carried out anticancerous activity on A-549 Lung cancer cell line using methanolic extract of *C.fimbriata* of different concentrations. The extract at the concentration of 50 µg/mL, showed maximum cytotoxicity against the A-549 cell lines. The activity was measured using MTT Assay. (Priya *et al.*, 2014). Chemical constituents like polyphenolic compounds and flavonoids might be responsible for the anticancerous activity by inhibiting the metabolic activity or by preventing the growth of the cancerous cell (Zhao *et al.*, 2007).

Anti inflammatory activity :

Inflammation is an immune response triggered by various factors like damaged cells, pathogens and toxic

compounds. The persistent inflammation results in severe side effects in various organs of the body. The anti-inflammatory activity on Raw 264 Macrophage cell lines by Krishnaa *et al.* (2018) reveals that Ethanolic extract of *C. fimbriata* decreased the nitrous oxide level by interfering in the gene expression of nitrous oxide and also decreased the production pro inflammatory modulators which results in the anti inflammatory activity in Raw 264 cell lines treated with lipo polysaccharides (Krishnaa *et al.*, 2018).

Anti oxidant activity :

A study Priya *et al.* (2014) revealed that the activity of Ethanolic extract of CF showed the most potent antioxidant activity through DPPH assay and hydrogen peroxide assay. They also stated (Ajit *et al.* (2017) that the aqueous extract of CF shows less antioxidant potential than the ethanolic extract of CF. The potent antioxidant and free radical scavenging activity is due to the presence of phytochemicals like phenolics and flavonoids in the CFE (Asmi *et al.*, 2017).

Anti microbial activity :

Hydro alcoholic extract CF at different Concentration (15mg/ml, 20mg/ml and 25mg/ml) at room temperature for 24hrs through disk diffusion method showed Antibacterial and Antifungal activity (*E.coli* and *P. aurogenosa*, respectively). The plant extract rich in tannin and phenolic compounds are involved in the antimicrobial activity (Lavanya *et al.*, 2019). Stem extract of CF shown Zone of inhibition on the bacterial samples isolated from stool and sputum sample the study also reported that the bacillus subtilis shown highest antimicrobial activity than the S. aureus. (Packialakshmi and Naziya (2014).

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