

IN VITRO HYPOGLYCEMIC ACTIVITY OF CRUDE ETHANOLIC LEAF EXTRACT OF COLDENIA PROCUMBENS

¹MALAVIKA PRADEEP,^{2*}Gayathri .R, ³V.Vishnu Priya

ABSTRACT--To analyse and estimate the hypoglycemic activity of ethanolic leaf extract of *Coldenia procumbens* *Coldenia procumbens* was weighed and crushed in pestle and mortar and 50% of ethanolic extract was prepared by solvent extraction method hypoglycemic activity of *coldenia procumbens* was evaluated. From the study it is evident that ethanolic extract of *coldenia procumbens* possess hypoglycemic activity The extract can be further purified and analysed for its hypoglycemic activity in *invivo* studies.

KEYWORDS-- *in vitro* hypoglycemic activity of crude ethanolic leaf extract of *coldenia procumbens*

I. INTRODUCTION

Coldenia is a flowering plant that is monotypic in genus and it is included in the borage family traditionally. In India, it is found in South India on waste lands widely and it is also common in dry rice grounds. When the dried leaves of *Creeping Coldenia* are pulverized, it provokes sneezing. The fresh leaves of the *Coldenia* are ground up and applied to rheumatic swellings commonly in India.

It is also helpful and useful in suppuration of boils, fever, piles and scorpion sting. The plant extract of *Coldenia* can also be used in treating *Leucorrhoea* and *Menorrhagia* diabetes. (1) (2) *Coldenia procumbens* Linn. have the chief constituents of glycosides, phytosterols, proteins, amino acids, fixed oils flavonoids, gums and mucilage.

Low blood sugar, which is also known as hypoglycemia is caused due to the fall in [blood sugar](#) to levels that are below normal. Various bioactive compounds are included in medicinal herbs, due to which they can display multiple actions on the production of insulin and also can distinct insulin action mechanisms such as insulin sensitizing, insulin mimicking, and inhibition of intestinal carbohydrate digestion and absorption. (4,5) The highest prevalence of diabetes in adults is found in Middle East and North Africa region where the percentage is 10.9%. The greatest number of adults diagnosed with diabetes is in the Western Pacific region and has countries with the highest prevalence of diabetes (37.5%). (6) Polyuria, polydipsia, weight loss, sometimes with polyphagia, and blurred vision are all symptoms or indications of hyperglycemia or increased blood sugar. People who have

¹ Graduate Student, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai

² *Assistant Professor Department of Biochemistry, Saveetha Dental College Saveetha Institute of Medical and Technical Sciences, Saveetha University, 160, Poonamallee High Road, Chennai 600077, Tamil Nadu, India, gayathri.jaisai@gmail.com, Telephone No: 9710680545, Chennai

³ Professor Department of Biochemistry, Saveetha Dental College Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai.

chronic hyperglycemia can be susceptible to certain infections and they also face certain impairments in their growth. Hyperglycemia with ketoacidosis or the nonketotic hyperosmolar syndromes are accompanied by diabetes which can be of uncontrolled level, that are life threatening and acute as well.

The lowering of postprandial blood glucose levels by the use of herbal extracts is possible by the inhibition of alpha-amylase and alpha glucosidase activity. In the following in-vitro studies it was demonstrated that different plants are able to inhibit α -amylase, which is responsible for the breakdown of oligosaccharides into monosaccharides which are absorbed. (8). Ethanolic extract of *Coldenia procumbens* possess hypoglycemic activity. The hypoglycemic capacity of *Coldenia procumbens* can be proved effective in comparison to the standard drug. Hypoglycemic activity of *Coldenia procumbens* can be estimated by:

1. Alpha amylase inhibitory activity of *Coldenia procumbens* extract.
2. Alpha glucosidase inhibitory activity of *Coldenia procumbens* extra

II. MATERIALS AND METHODS -

Coldenia Procumbens:

The herb *Coldenia Procumbens* was purchased from organic supermarket in Chennai.

Ethanolic leaf extract of *Coldenia procumbens* -

Coldenia procumbens leaves were weighed and crushed in pestle and mortar and 50% of ethanolic extract was prepared by the solvent extraction method.

Hypoglycemic activity of *Coldenia procumbens* :

In Vitro hypoglycemic activity of *Coldeina procumbens* was analysed by:

In vitro α -amylase inhibitory activity of *Coldenia procumbens* extract

α -amylase inhibitory activity of extract was carried out according to the standard method of Ademiluyi et al. (2013). In a test tube, reaction mixture containing 500 μ l phosphate buffer (100 mM, pH = 6.8), 100 μ l α -amylase (2 U/ml), and 200 μ l of varying concentrations of extract (0.1 to 0.5 mg/ml) was pre incubated at 37°C for 20 min. Then, the 200 μ l of 1% soluble starch (100 mM phosphate buffer pH 6.8) was added as a substrate and incubated further at 37°C for 30 min; 1000 μ l of the 3,5-dinitrosalicylic acid (DNS) DNS color reagent was then added and boiled for 10 min. The absorbance of the resulting mixture was measured at 540 nm using Multiplate Reader (Multiska thermo scientific, version 1.00.40). Acarbose at various concentrations (0.1–0.5 mg/ml) was used as a standard.

The results were expressed as percentage inhibition, which was calculated using the formula,

$$\text{Inhibitory activity (\%)} = (1 - A_s/A_c) \times 100 \text{ Where,}$$

A_s is the absorbance in the presence of test substance and

A_c is the absorbance of control.

α -glucosidase inhibitory activity of *Coldenia procumbens* extract

α -glucosidase inhibitory activity of extract and fractions was carried out according to the standard method of Ademiluyi et al. (2013). In a test tube contains, reaction mixture containing 500 μ l phosphate buffer (100 mM, pH

= 6. 8), 100 µl alpha-glucosidase (1 U/ml), and 200 µl of varying concentrations of extract and fractions (100, 200,300, 400 and 500µg/ml) was pre incubated at 37°C for 15 min. Then, 200 µl P-NPG (5 mM) was added as a substrate and incubated further at 37°C for 20 min. The reaction was stopped by adding 50 µl Na₂ CO₃ (0.1 M). The absorbance of the released p-nitrophenol was measured at 405 nm using Multiplate Reader. Acarbose at various concentrations (0.1–0.5 mg/ml) was included as a standard.

The results were expressed as percentage inhibition, which was calculated using the formula,

$$\text{Inhibitory activity (\%)} = (1 - \text{As}/\text{Ac}) \times 100$$

Where, As is the absorbance in the presence of test substance and
Ac is the absorbance of control.

III. STATISTICAL ANALYSIS

The data were be subjected to statistical analysis using one-way analysis of variance (ANOVA) and Duncan's multiple range test to assess the significance of individual variations between the groups. In Duncan's test, significance was considered at the level of $p < 0.05$.

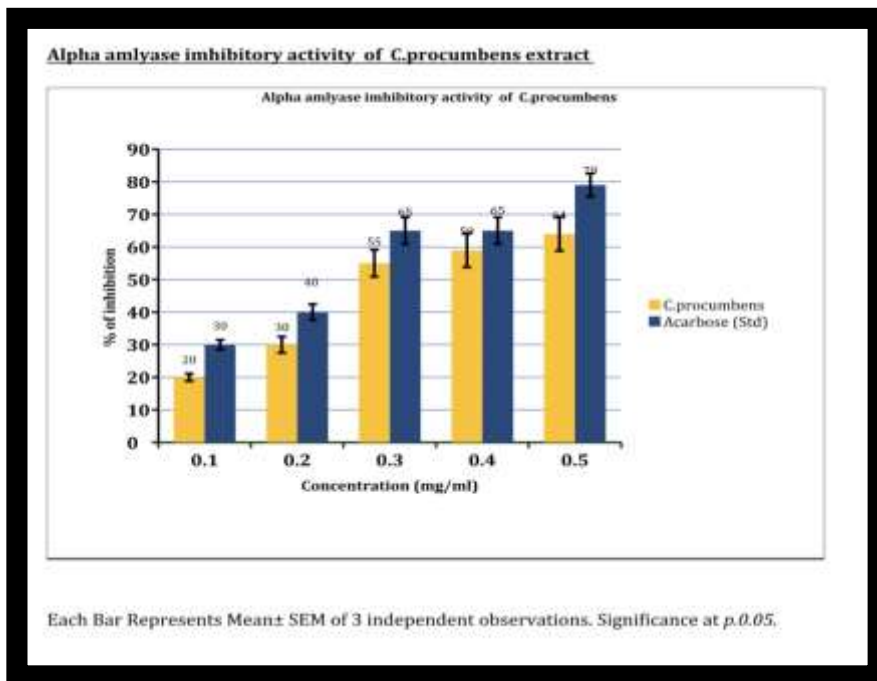
IV. RESULTS

The inhibitory activity percentage can be estimated by the following formula
The result obtained can be expressed in graphical representation.

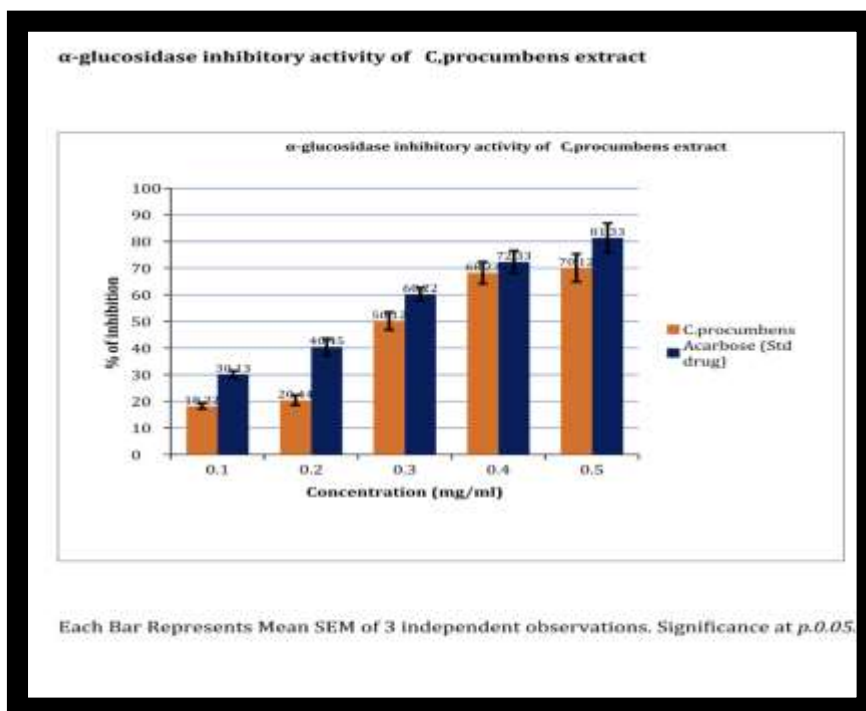
$$\text{Inhibitory activity (\%)} = (1 - \text{As}/\text{Ac}) \times 100$$

As is absorbable in the presence of test substance
Ac is the absorbance of control

Graph 1 - Alpha amylase inhibitory activity of *Coldenia procumbens* extract



Graph 2 - Alpha Amylase activity of *Coldenia procumbens* extract



In the following graph the alpha amylase inhibitory activity of *Coldenia procumbens* and the standard drug Acarbose is compared. The y-axis and the x-axis represents percentage of inhibition and concentration (mg/ml) respectively. The alpha amylase inhibitory activity of acarbose is greater compared to *Coldenia procumbens*

V. DISCUSSION

From the study it is evident that ethanolic leaf extract of *coldenia procumbens* possess hypoglycemic activity. The hypoglycemic capacity of *coldenia procumbens* proved to be effective in comparison to the standard drug.(graph 1 & 2)

Preliminary phytochemical screening of the extract was done and it showed the presence of reducing sugars, cardiac glycosides, tannins, saponins, glycosides, flavonoids and steroids. Previous similar study with basilus also exhibits similar in vitro antidiabetic activity . It also offered positive benefits to control diabetes.(10) Similarly,*Coldenia procumbens* Linn. have the glycosides, phytosterols, proteins, amino acids, fixed oils flavonoids, gums and mucilage as chief constituents and with the help of inhibitory activities such as alpha amylase inhibitory activity and alpha glucosidase inhibitory activity, it is estimated that *coldenia procumbens* also possess hypoglycemic activity

The anti diabetic effect of *coldenia procumbens* was tested and evaluated by for its phytochemicals which are proven to be anti diabetic in nature(11). Hence the present in vitro study which states presence of hypoglycemic activity in *Coldenia Procumbens* is also proved true. The anti diabetic effect of *Coldenia procumbens* can be used for curing diabetes in humans

Strong associations are stated between decreased anti-diabetic medication adherence and increased health care service utilization. Diabetes mellitus is basically one of the most common endocrine metabolic disorder .It has caused significant morbidity and many deaths because of complications that are microvascular (retinopathy,neuropathy,and nephropathy) and macrovascular (heart attack, storke, and peripheral vascular disease) .Plants have been always a very good source of drugs and many of the currently available drugs have been derived directly or indirectly from them through different processes. So,*Coldenia procumbens* is also one such plant that have hypoglycemic or anti diabetic effect and can be used against diabetes.

In the following graph the alpha glucosidase inhibitory activity of *Coldenia procumbens* and the standard drug Acarbose is compared. The y-axis and the x-axis represents percentage of inhibition and concentration (mg/ml) respectively. The alpha glucosidase inhibitory activity of acarbose is greater compared to *Coldenia procumbens*.

VI. CONCLUSION

From the above study it is very much clear that *coldenia procumbens* possess In Vitro antidiabetic activity. Therefore, the extract can be further purified and analysed for it's hypoglycemic activity in in vivo studies as well.

REFERENCES

1. Sudarsanam, G and Prasad G.S., J. herbs, spices, Med. Plants, 31, 57-66,1955.
2. Saluja, A.K. and kakrani, H.K.N., Fitoterapia, 66(5), 427-430, 1994.

3. Bhat, R.B. Adeloje, A.A and Etejere, E.O., *J.Econ. Taxon. Bot.*, 6(1)-165, 1985.
4. Venkata S.S.N.kantamreddi, Y.Nagendra lakshmi and V.V.V.Satyanarayana Kasapu, Preliminary Phytochemical Analysis Of Some Important Indian Plant Species, *International Journal of Pharma And Bio Sciences*, vol 1, issue 4, 2010, B-351-358. .
5. R.Kannan and M.Jegadeesan, Physicochemical Characteristics of *Coldenia Procumbens* Linn, *Ancient Science of Life*, Vol XXIII(1), 2003,1-4.
6. Senthamarai R, Kavimani S, Jaykar B, Uvarni M, Analgesic Activity of Leaf Extract of *Coldenia Procumbens*, *Linn. Hamdard Medicus*, vol. 44(3), 2001, 20-23.
7. Mrs.Beena P, Anti Bacterial Activity of *Coldenia Procumbens*, *Ancient Science of Life*, Vol: XXIV (3), 2005, 1- 3. .
8. Ramakrishnan G, Kothai R, Jaykar B, Venkataratna Kumar T, In Vitro Anti Bacterial Activity of Different Extracts Of Leaves of *Coldenia Procumbens*, *International Journal of PharmTech Research*, Vol. -3, No.2, 2011, 1000-1004.
9. Arul B, Kothai R, SureshKumar K and Christiana A.J.M, AntiInflammatory Activity of *Coldenia Procumbens* Linn, *Pakistan Journal of Pharmaceutical Sciences*, Vol. 18, No.3, 2005, 17-20. .
10. . Lavanya R, Uma Maheswari S, Harish G, Bharath raj J, Kamali S, Hemamalini D, Bharath Varma J, Umamaheswara Reddy C, In Vitro Anti Oxidant, Anti Inflammatory And Anti Arthritic Activities In The Leaves Of *Coldenia Procumbens* Linn, *Research Journal Of Pharmaceutical, Biological And Chemical Sciences*, 1(4), 2010,753-762.
11. .Patel N, Raval S, Goriya H, Jhala M, Joshi B, Evaluation Of Ant Diabetic Activity Of *Coldenia Procumbens* In Alloxan – Induced Diabetes In Rat, *J Herb Pharmacother*, 7(1), 2007, 13-23.