

Pharmacognostic and antihyperglycemic study of *Coccinia indica*

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Abstract

A comprehensive herbal drug therapeutic regimen offers time tested safe and effective support to conventional therapy in the management of diabetes. This is combination with adequate dietary management and physical activity would provide an integrated approach to the management of this deadly disease, particularly Type 2 diabetes. Additionally, due to unlimited potential of herbal drugs for innovative bioactive molecules, all efforts should be made to adopt a package of best practices encompassing conservation, cultivation, quality control, standardization and research and development for medicinal plants and herbals. Chronic administration of kundru fruit extracts (200mg/kg) for 14 days reduces the blood glucose level of the diabetes induced animals as compared to diabetic control group. There was significant decrease in the blood glucose level in the 7th [p<0.01] and 14th [p<0.001] days of the diabetes induction, showing antidiabetic effect of the concern fruit. The effect was comparable to that of standard antidiabetic drug Glibenclamide. The hypoglycemic effect of orally administered extracts of leaves and roots of *Coccinia indica* has been reported earlier but none of the literatures or paper shows the antidiabetic activity of fruit of the above plant as in crude extract while the whole fruit extract shows significant anti diabetic activity.

Keywords: Diabetes; *Coccinia indica*; Hypoglycemic activity; Chronicle administration; Indigenous herbs

Introduction

The medicine man and herbalist undertook in various ways to cure man's disease and bring relief to the sick. A vast majority of population particularly those living in villages depend largely on herbal medicines. Scientific data on a good number of medicinal plants investigated has been well documented. However, only very few drugs of plant origin could reach clinical use and the National Formulary could not adopt even a dozen of plant medicines. For this reason, a special effort is needed for development of herbal drugs having therapeutic utility.

A number of reviews have been published on plants screened for hypoglycemic activity in India [1-11]. High carbohydrate diet increases the sensitivity of peripheral tissues to both endogenous and exogenous insulin. Such diet improves glucose tolerance and lowers the level of serum insulin. In addition, the liberalization of carbohydrate might facilitate the reduction of saturated fatty acids and cholesterol in the diabetic diet [12].

These data show that Plants based drugs can be useful and they may be collected, dried and used

as therapeutic agents (crude drugs), or their constituents/active principles separated by various chemical processes which are employed as medicines. The phytochemicals identified from traditional medicinal plants are presenting an exciting opportunity for the development of new types of therapeutics [13]. Since olden days, plants are used to treat many ailments and India has about 45,000 plant species and several thousands have been claimed to possess medicinal properties [14]. It is also well known that certain foods may have the potential to prevent diseases [15-16]. The hypoglycemic effect of orally administered extracts of leaves and roots of *Coccinia indica* has been reported earlier but none of the literatures or paper shows the antidiabetic activity of fruit of the above plant as in crude extract while as this research was aimed to explore that the whole fruit extract shows significant anti diabetic activity.

Materials and Methods
Pharmacognostic study



Figure 1. Kundru Fruit

Species-*coccinia indica*, family-cucurbitaceae

The various plant parts of *Coccinia indica* have been widely used in the traditional treatment for diabetes. It has been observed on analyzing the several literatures that aqueous and ethanolic extracts of *coccinia indica* leaves possessed antidiabetic activity. Fruit of this plant is widely used as a vegetable all over India. we have under

taken investigations on the effect of the fruit on some aspects of carbohydrate metabolism. The hypoglycemic effect of orally administered extracts of leaves and roots of *Coccinia indica* has been reported earlier. The oral administration of the pectin isolated from the fruit of the above plant at a dose of 200 mg/100 g BW/day showed a significant hypoglycemic action in normal rats. Pectin isolated from many other plants have also been reported to have hypoglycemic actions. The pectin administration resulted in a significant reduction in blood glucose and an increase in the liver glycogen. Glycogen synthetase activity was highly significant. Incorporation of labeled glucose into hepatic glycogen was also found to be higher. A significant reduction in phosphorylase activity was noted in the pectin-administered groups [17].

Determination of pH

Method: 1gm of accurately weighed drug was heated with 100ml of distilled water and filtered. pH of the filtrate was checked with a pH meter having standardized glass electrode. The pH of the filtrate was found to be 5.54.

Physical evaluation

Several physical parameters has been determined which is stated in Table 1.

Table 1. Physical evaluation parameters

| Parameter | Kundru |
|----------------------------|--------|
| Loss on Drying | 16.8% |
| Total Ash | 11.6% |
| Acid insoluble Ash | 0.5% |
| Water Soluble Ash | 20% |
| Sulphated Ash | 15% |
| Water Soluble Extractive | 25% |
| Alcohol Soluble Extractive | 15% |

Preparation of extracts by hot extraction method

The coarsely powdered dried fruit of *Coccinia indica* about 400gm was extracted with Hydro-

alcoholic solution (1:1) by continuous extraction method using soxhlet apparatus. The Hydro-alcoholic extract was filtered and concentrated to

a dry mass by using oven. A greenish black color residue was obtained.

Table 2. Antidiabetic studies

| Groups | Dose mg/kg | Treatment (Days) (Mean ± SE, n= 6) | | |
|----------------------------|---------------|------------------------------------|---------------|---------------|
| | | 0 | 7 | 14 |
| Control (Normal Saline) | 2ml/kg | 90.3 ± 4.6 | 90.8 ± 3.6 | 90.8 ± 6.6 |
| Diabetic control (Alloxan) | 150 | 263.3 ± 18.4 | 262 ± 19.2 | 262.3 ± 17.7 |
| MG-01 | 200 | 262 ± 16.0 | 162.3 ± 10.2* | 127.6 ± 9.9** |
| Glibenclamide | 2.5 | 260 ± 14.3 | 150 ± 9.2* | 118.3 ± 6.2** |

Data are expressed as mean ± S.E., n = 6, * p< 0.01 Vs Control, **p < 0.001 Vs Control

Animals used

Wistar Albino rats (150-180gms) were selected for these studies. Six rats were taken for each group. The rats were used after an acclimatization period of 7 days to the laboratory environment. They were provided with food and water.

Antidiabetic activity [18]

Preparation of diabetic rats

Hyperglycemia was induced by intra peritoneal injection of freshly prepared aqueous solution of alloxan monohydrate (SD fine Chemicals Pvt. Ltd., Biosar) 150 mg /kg, to overnight fasted rats. Control rats receives similar volume of vehicle, normal saline (2 ml/kg body weight) alone. Animals that did not develop Hyperglycemia after 48 hr of alloxan injection were rejected and new animals were used. Immediately after confirmation of diabetes, rats were classified into six groups of six rats each.

Experimental animals

Group I received normal saline and served as Control. Group II treated with alloxan monohydrate 150 mg/kg served as diabetic Control. Group III are treated with Plant extract

(200 mg/kg) with MG 01, Group IV is treated with glibenclamide (2.5mg/kg) and served as reference standard. Treatment continued for 14 consecutive days. Before the treatment (0 day), and at the end of 7th and 14th day plasma levels were estimated using the glucose oxidase method [19] (Table no.-2). The results were analyzed by students ‘t’ test [20].

Results and discussion

Antidiabetic effect of plant extracts

As shown in table 2 Chronic administration of fruit extracts (200mg/kg) for 14 days reduces the blood glucose level of the diabetes induced animals as compared to diabetic control group. There was significant decrease in the blood glucose level in the 7th[p<0.01] and 14th [p<0.001] days of the diabetes induction, showing antidiabetic effect. Each bar represent the mean ± SEM (n=6). *p<0.01, **p<0.001 when compared against control group .The data were analyzed by one way ANOVA followed by post – hoc Newman-Keuls multiple comparison test.

Table 3. Pathological parameters

| Treatment | Protein mg/dl | Urea mg/dl | TGL mg/dl | HDL mg/dl | LDL mg/dl | VLDL mg/dl | Total Cholesterol |
|-------------------------------|-------------------|-------------------|---------------------|-------------------|----------------------|--------------------|----------------------|
| Normal | 1.91 ± 0.06 | 22 ± 0.23 | 76.12 ± 4.12 | 24.5 ± 1.32 | 39.12 ± 4.13 | 15.22 ± 0.82 | 78.84 ± 6.27 |
| Diabetic control (Alloxan) | 7.1 ± 0.43 | 34.0 ± 0.47 | 114.22 ± 7.43 | 73.79 ± 4.7 | 145.41 ± 1.2 | 22.8 ± 1.48 | 242 ± 7.38 |
| MG-01 (200 mg/kg) | 4.7 ± 0.31 | 28.3 ± 1.3 | 93.42 ± 4.8 | 40.3* ± 2.7 | 50.22** ± 2.54 | 18.68 ± 0.96 | 109.20 ± 5.20 |
| Glibenclamide (2.5 mg/kg) | 3.8 ± 0.13 | 22.8 ± 1.1 | 85.74* ± 4.9 | 36.4* ± 2.8 | 31.8** ± 1.2 | 17.3 ± 0.98 | 84.94 ± 4.98 |

Values are expressed as Mean ± SE., n = 6, * p < 0.01 Vs Control, ** p < 0.001 Vs Control

Effect of plant extract on Pathological parameters of Diabetic induced animals

As shown in table 3, the chronic administration of fruit extracts 200mg/kg for 14 days showed significant decrease in the pathological parameters viz. protein, urea, TGL, HDL, LDL etc. as compared to diabetic control animals showing antidiabetic activity.

Each bar represent the mean ± SEM (n=6). *p<0.01, **p<0.001 when compared against control group. The data were analyzed by one way ANOVA followed by post-hoc Newman-Keuls multiple comparison test.

The result shows that the extract of MG-01 having good antidiabetic activity and are able to decrease the amylase activity significantly.

The phytochemicals identified from traditional medicinal plants are presenting an exciting opportunity for the development of new types of therapeutics. The hypoglycemic effect of orally administered extracts of leaves and roots of *Coccinia indica* has been reported earlier but none of the literatures or paper shows the antidiabetic activity of fruit of the above plant as in crude extract. The oral administration of the

pectin isolated from the fruit of the above plant at a dose of 200 mg/100 g BW/day showed a significant hypoglycemic action in normal rats. These data show that a reliable, cost saving therapy with traditionally used plants could be a possibility to lower the problems of untreated diabetes because of a lack of synthetic drugs.

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