Hypoglycemic and Hypolipidemic effect of *Coccinia indica* Wight & Arn in alloxan induced diabetic rats

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**Abstract**

Diabetes Mellitus is characterized by elevated plasma glucose concentrations resulting from insufficient insulin. The present study was aimed to investigate the hypolipidemic effect of *Coccinia indica* aqueous leaf extract in alloxan induced diabetic rats. The results of this study revealed that a continuous administration of *Coccinia indica* extract for 21 days prevents the elevation of the level of serum lipids secondary to the diabetes state.

**Keywords**:  
*Diabetes mellitus, Coccinia indica*

**Introduction**

Diabetes is the most common endocrine disorder characterized by hyperglycemia and a predisposition to chronic complications like retinopathy, nephropathy, neuropathy and macrovascular disease (1). It is associated with increased passive permeability of many nutrients like glucose, galactose, cholesterol and conjugated salts (2). Natural carbohydrate rich in fibre content have been found effective against hyperlipidemia and ischaemic heart diseases (3). Diabetes mellitus is a disease that affects more than subjects in the next ten years (4). Long before the use of insulin indigenous remedies have been used for the treatment of diabetes mellitus. There is an increasing demand by patients to use the natural products with antidiabetic activity. This is because insulin cannot be used orally and continuous insulin injections have many side effects and toxicity (5).
Many medicinal plants have been found to possess active principles useful for treating the disease and are frequently considered to be less toxic and free from side effects than synthetic chemicals (6). Hence the present study was aimed in investigating the hypolipidemic effect of *Coccinia indica* aqueous leaf extract in alloxan-induced diabetic rats.

**Materials and Methods**

*Coccinia indica* belonging to Curcurbitaceae family was locally collected and identified at the department of Botany, PSG college of Arts and Science College, Coimbatore.

**Preparation of the Extract:**

Fresh tender leaves were collected, dried in shade and powdered. 10 gm of leaf powder was mixed with 100 ml of distilled water and stirred for 2 hrs. It was kept overnight at 4°C and the supernatant was collected. This was used as the crude leaf extract to study the hypolipidemic effect in alloxan-induced diabetic rats.

**Animals used for experiment**

Male albino rats (150-200 gm) were obtained from Centre for Animal health. Madhavaram, Chennai. All the rats were fed with normal diet. Rats were divided into 4 groups of 6 each. The animals were treated as per the following protocol

**Group I**: Kept as normal group
**Group II**: Alloxan Monohydrate was used to induce diabetes mellitus in rats.

After 24 hrs of fasting a single dose (200 mg/ kg body weight) of 5% alloxan monohydrate in saline was injected intra peritoneally.

**Group III**: Alloxan injected and leaf extract given orally after 5 days and the treatment continued for 21 days.

**Group IV**: Normal rats, treated with leaf extract orally for 21 days.

**Collection of rat blood**

After 21 days feeding of extract, on the 22nd day the blood was directly collected by cardiac puncture with a sterilized syringe. The serum sample was collected and used for the estimation of glucose7 and cholesterol8, triglycerides9, LDL, VLDL and HDL10 as per the standard methods.

**Results and Discussion**

Many plants have been used for the treatment of diabetes mellitus in Indian system of Medicine and in other ancient systems of the world. Out of these only a few have been evaluated as per modern system of medicine. From many such plants only extracts have been prepared and their usefulness evaluated in experimental diabetes in animals. Most of them to act directly pancreas (pancreatic effect) and stimulate insulin level in the blood. Some have extra pancreatic effect by acting directly on tissues like liver, muscle etc., and alter favorably the activities of the regulatory enzymes of glycolysis, glyconeogenesis and other pathways. This study demonstrated the hypoglycemic and hypolipidemic effect of *Coccinia indica*.
leaf extract on blood glucose and cholesterol, TG, LDL, VLDL level in alloxan induced diabetic rats. The results are depicted in Table-1. The group II alloxan induced diabetic rats showed a significant (P<0.05) increase in blood glucose level when compared to the group I rats. In group III, there was a significant decrease of blood glucose level when compared to the group II rats.

We identified that this effect of *Coccinia indica* leaf extract not only showed hypoglycaemic effect but also hypolipidemic effect. In alloxan diabetic rats there was a significant (P<0.05) increase of total cholesterol and triglycerides in serum compared to that of group I. There was a significant decrease in group III animal when compared to the group II animals.

The insulin deficient subjects fail to activate the enzymes and causes hyper triglyceridemia. Excess of fatty acid in plasma produced by the alloxan induced diabetes promotes the liver conversion of home fatty acids in to phospholipids and cholesterol. In group III there was an significant increase in VLDL and LDL level when compared to the group II rats. Lowering of serum lipid concentrations through dietary or drugs therapy seems to be associated with a decrease in the risk of vascular disease. The results of this study revealed that a continuous administration of *Coccina indica* extract for 21 days prevented the elevation of the levels of serum lipids secondary to the diabetes state.

| Groups   | Cholesterol (mg/dl) | Triglycerides (mg/dl) | VLDL (mg/dl) | LDL (mg/dl) | Glucose (mg/dl) |
|----------|---------------------|-----------------------|--------------|-------------|-----------------|
| Group I  | 112.50 ± 12.50      | 76.63 ± 0.85          | 15.35 ± 0.27 | 36.90 ± 0.47 | 81.75 ± 1.13    |
| Group II | 355.00 ± 10.00*     | 224.20 ± 7.51*        | 35.50 ± 0.43*| 204.40 ± 0.67* | 192.03 ± 18.07* |
| Group III| 191.25 ± 6.50*      | 107.25 ± 6.01*        | 22.90 ± 0.83*| 103.25 ± 0.43* | 119.43 ± 1.61*  |
| Group IV | 94.75 ± 5.44NS      | 83.08 ± 0.86NS        | 20.68 ± 0.44*| 40.55 ± 0.45*  | 65.28 ± 3.28*   |
| CD (0.05)| 18.452              | 18.452                | 1.058        | 0.923        | 16.99           |
| CD (0.01)| 26.509              | 26.509                | 1.521        | 1.326        | 24.41           |

Values are expressed by mean of 6 samples
* - Significant NS – Not significant
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