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RESEARCH ARTICLE

Antidiabetic Effect of *Morinda citrofolia* and *Coccinia indica* in Alloxan induced Diabetic rats

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ABSTRACT

Antidiabetic effects of combined aqueous fruit extract of Morinda citrifolia and Coccinia indica were evaluated in alloxan induced diabetic rats. The combined aqueous fruit extract of M. citrifolia and C. indica at a concentration of 300 mg/kg body weight/rat/day was orally administered to Alloxan induced diabetic rats for a period of 30 days. The elevated levels of blood glucose in the diabetic rats reverted back to near normal after treatment with the combined aqueous fruit extract of Morinda citrifolia and Coccinia indica. Similarly significant decrease in the levels of plasma insulin elevated to near normal after treatment with fruit extract, suggesting the antihyperglycemic effect of combined aqueous fruit extract of Morinda citrifolia and Coccinia indica.

KEYWORDS: *Diabetes mellitus, Alloxan, Fruit extract*

INTRODUCTION

Diabetes mellitus describes a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both . Approximately 140 million people worldwide suffer from diabetes. The disease becomes a real problem of public health in developing countries, where its prevalence is increasing steadily and adequate treatment is often expensive or unavailable. Alternative strategies to the current modern pharmacotherapy of diabetes mellitus are urgently needed , because of the inability of existing modern therapies to control all the pathological aspects of the disorder, as well as the enormous cost and poor availability of the modern therapies for many rural populations in developing countries[1,2]. Plants used in traditional medicine to treat diabetes mellitus represent a valuable alternative for the control of this disease.

Morinda citrifolia L (Noni) is one of the traditional folk medicinal plants that has been used for over 2000 years in southeast asia and used in india. It has been reported to have a broad range of therapeutic and nutritional value, including antibacterial, antiviral, antifungal, antitumor, antihelmin, analgesic, hypotensive, anti-inflammatory, and immune enhancing effects[3-5].

Coccinia indica (Bimba in Sanskrit) known as Ivy Gourd has a long history in ancient Indian medicinal system for its use in diabetes, bronchitis and skin diseases. It is a climbing perennial herb, growing wild throughout India [6].

In the present study, the antidiabetic effect of the fruit extract of *Morinda citrifolia* L and Coccinia indica in Alloxan induced diabetic rats was evaluated.

MATERIALS AND METHODS

Experimental Animals

Albino rats of the Wister strain were used. They weighed between 180 and 200g and were fed on Goldmohar brand feed (manufactured by Lipton India Ltd., New Delhi) and water *ad libitum*. The albino rats maintained under the Good Laboratory Practices (GLP) and follow the guidelines of Committee for the Purpose of Control and Supervision on Experiments on Animals (CPCSEA)[7].

Medicinal plants

The fruits of *Morinda citrofolia* and *Coccinia indica* were used. The plants were obtained from medicinal plant farm house [Govt Regd.], Lucknow. They were identified and authenticated by plant experts in the Department of Botany, Govt P.G.College, Jalesar, Etah.

For the preparation of aqueous extract, a decoction was prepared by bringing 500 gm/L of material to boil in the water.The suspension was filtered (Whatmann No.1 filter paper) and the filtered solution was brought to dryness under vacuum. The dried fraction was stored at -20^{0}C until required. The dried fraction was re-extracted with distilled water for experimentations. The rats were given free access to the extracts (300 mg/kg b.wt.) for a period of 7,15 and 30 days .

Induction of diabetes in rats

The rats were injected intraperitonial with alloxan monohydrate (Span Chemical Co., Mumbai) dissolved in sterile normal saline at a dose of 120 mg kg-1 b.wt. The rats were kept for 15 days to stabilize the diabetic condition .Only rats with a fasting blood glucose level of at least 200 mg/dl [8].

Blood Collection

The blood samples were collected directly from ventricle of heart . The blood samples which were collected in heparinised tubes were then centrifuged at 3000g for 15 minutes. The clear serum obtained was used for the analysis of glucose and insulin.

Experimental Design

Animals were divided into three groups and for each group six animals were taken. Group I (Normal control) (0.9% NaCl; 5ml/kg.b.w.), Group II served as Alloxan induced diabetic control, Group III received combined fruit extract of *M.citrofolia* and *C.indica* (300mg/kg.b.w.) once a day for 7,15,and 30 days.

Oral Glucose Tolerance Test (OGTT)

The oral glucose tolerance test (OGTT) was performed for dose of aqueous fruit extract of *M.citrofolia* and *C.indica* (300mg/kg.b.w.) and blood glucose level was measured by one touch glucometer (accu-check). The glucose level was measured at the interval of 0, 30, 60, and 120 min after the administration of extract.

Biochemical assays

Fasting blood glucose level, lipid profiles and biomarkers were evaluated in normal and diabetic rats. The blood glucose level was estimated by one touch glucometer (Accu check). The serum insulin was estimated by Radioimmunoassay (RIA) method [9].

Statistical analysis

All the values in the test are presented as mean ± SEM . Statistical differences between the means of the various groups were evaluated by one-way analysis of variance (ANOVA) using the SPSS program followed by Students'*t*-test. P values of 0.05 or less were considered to be significant.

RESULTS AND DISCUSSION

The mean blood glucose concentration of controlled and aqueous fruit extract of *M.citrofolia* and *C.indica* treated animals on 0, 30, 60 and 120 min are in table-1. The significant reduction ($p<0.01$) of blood glucose was observed at 60 and 120min of the experiment. Table-2 showed serum glucose decrease and insulin was increased significantly $p<0.001$ after oral administration of combined aqueous fruit extract of *M.citrofolia* and *C.indica* in alloxan induced diabetic rats during 7,15 and 30 days respectively as compared to diabetic controls. In the present study, oral administration of *M.citrofolia* and *C.indica* aqueous fruit extract decreased serum glucose and enhanced insulin level in diabetic rats. This hypoglycemic effect may be due to depression of key gluconeogenic or the increase in the levels of glucose transportes and stimulation of uptake in peripheral tissues [8]. Another effect of these plants extract may be that it preserve the cells of islets of langerhans of β-cells functions, which results in a significant increase in insulin activity[3-6].

Table-1: The Effect of plant extracts on blood glucose levels in alloxan-induced diabetic rats (mg /dl)

Treatment	0h	30min	60min	120min
Normal	93±3.2	133 ±6.7	129± 5.8	125±6.0
Diabetic control	298±10.8	301±7.9	300±12.2	299.6 ±16.2
M.citroflia and *C.indica* (300mg/kg b.wt.)	275±19.8	234±4.6*	210±9.5*	177 ± 3.4*

Values are mean concentration of blood glucose ± S.E. (n=6)
Significantly increased or decreased values compared with 0 min data ($p<0.05$).

Table-2: Effect of aqueous fruit extract of *M. citrofolia* and *C.indica* on blood glucose and insulin activity in Alloxan induced diabetic rats.

Parameters	**Normal**	**Diabetic control**	**Diabetic control+ fruit extract of *M.citroflia* and *C.indica* (300 mg/kg b.wt.)**
Serum glucose (mg/dl)	105.5+2.11	298+10.8	227 + 12.9 195+17.8 124+4.6
Serum Insulin (µu/ml)	2.12+0.11	0.34+0.05	0.89+0.045 1.32+0.06 1.89+0.07

Values are given as mean S.Em. for 6 rats per groups
Significant at P<0.01*; P<0.001**

CONCLUSIONS

Our study have shown that the combined fruit extract of *M. cirofolia* and *C.indica* is most effective in glucose lowering effect in normal and alloxan induced hyperglycemic rats.

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