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EFFICACY OF *COCCINIA INDICA* W. & A. IN DIABETES MELLITUS

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Diabetic patients become susceptible to complications like hyperlipidemia and various types of bacterial infections. Many attempts have been made to manage diabetes by use of synthetic drugs, but all have met with limited success due to their side effects. Therefore, the concept of use of plant drugs have become the potent and safe alternatives. In view of this, trial of indigenous preparation from Coccinia indica W. & A. leaves has been taken up on 30 non insulin dependent (NIDDM) diabetic patients. The drugs was found to exert protective influence against hyperlipidemia along with the control of hyperglycemia.

Introduction

Plants are the only economic sources of well established important herbal drugs. These drug have made a significant constribution to human world in its struggle against various disease. The natives were making extensive use of indigenous medicinal plants to cure ailments. In the available literature of indigenous medicinal plants, *Coccinia indica* W.& A. has been described useful in treatment of diabetes by Kirtikar and Basu (1933) and Nadkarni (1954). These observations have been disputed by Mukherjee (1957) and Gupta (1963). Since, *Coccinia indica* W. & A. has been claimed as being efficaceous in treatment of diabetes, the complexity of disease and non availability of satisfactory results led the authors to undertake the present clinical trial.

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Methodology

All the subject registered for the trial of herbal drug and attended the follow up were treated at Akhil Bhartiya Ayurved Anusandhan Sansthan, Nagpur. The study group comprised of number of patients into four groups. Group I formed normal healthy control. Group II and III constituted untreated and treated diabetic (NIDDM) patients. Group IV comprised of diabetic (NIDDM) patients selected randomly and treated with hypoglycaemic drug, Diabenese in order to compare the hypoglycaemic effects of trial drug. The ages of both sex patients in all four groups were in the range of 21 to 55 years. All the patients registered for trial of herbal drug were subjected to oral glucose tolerance test along with other routing investigations to rule out other complications in diabetes. The diagnosis was made according to the criteria laid down by WHO expert committee on diabetes (1980). The concentrations of blood glucose in fasting less than 100mg./dl. and post meal (two hours after 75 gms. of glucose load) less than 180mg./dl. were accepted as normal while those of fasting more than 120mg/dl. and postmeal more than 180mg/dl. were granted as diabetic.

Drug and Diet

Fresh leaves of *Coccinia indica* W.& A. were collected locally and washed with water. They were macerated, crushed and boiled with water to get clear buff coloured decoction. This was then filtered and evaporated to thick paste. Pellets were made weighing 3 gms. each and dried in vaccum dessicator. One tablet was given to diabetics twice a day before meal. High calories diet intake was restricted to diabetic patients.

Follow up was done at 6 weeks interval for 2 consecutive periods. Glucose tolerance test was repeated after 6 weeks follow up and parallel lipid fractions were estimated. Patients who were irregular in attending for follow up and taking treatment were excluded.

Venous blood samples were obtained from the study group in the following manner and laboratory investigation was completed at Clinical Biochemistry Laboratory Govt. Med. College, Nagpur.

	Group	No. of patients
I	Normal healthy control	(15)
II	Untreated diabetic patients (NIDDM)	(30)
III	*Coccinia indica* W. & A. treated patients	(25)
IV	Diabenese treated patients	(15)

Venous blood samples of fasting and post meal were collected in flouride bulb for sugar estimation and the blood sample, collected in plain bulb, was utilized after separating sera from the clotted blood for lipid fractions.

Observations

Data presented in table- I summarises the levels of blood sugar in fasting and postmeal state and lipid fractions in normal controls, untreated and *Coccinia indica* W.&A. treated diabetic (N I D D M)

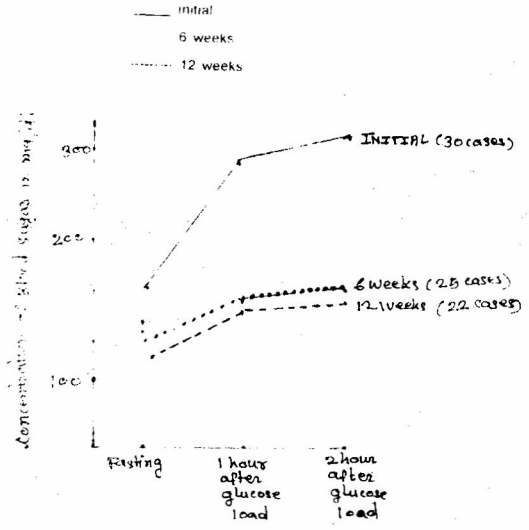

Fig. 1 Effect of *C. indica* W.& A. on GTT in diabetics before and after 6 weeks, 12 weeks treatment

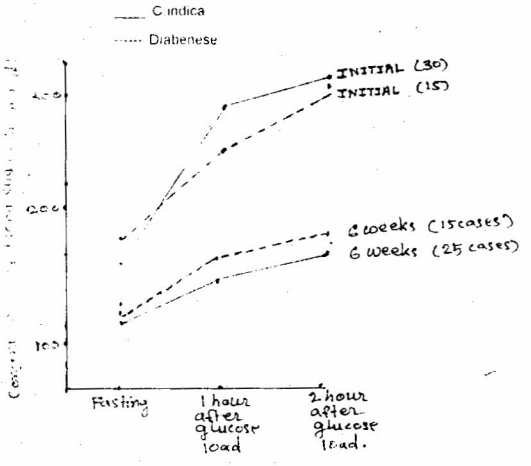

Fig. 2 Comparative study of *C. indica* W.& A. and Diabenese

patients. Raised levels of blood sugar with parallel increased lipid fractions with the severity of disease are highly significant ($p < 0.001$) as compared to normal control group- I. The results after *Coccinia indica* W.&A. treatment revealed depressions of peak value in sugar and parallel reduction in lipid fractions are also highly significant ($p < 0.001$). It is evident from table- II that the blood sugar levels after six weeks treatment found to have a comparable hypoglycemic effects to Diabenese (Group -IV).

Discussion

A large number of plants have been reported to execute an antidiabetic and anithyperlipidemic effect. This statement is important, since hyperlipidemia is almost prevalent among over weight

Table - I

Levels of blood sugar and lipid fractions in diabetics (NIDDM cases)

Parameter (mg./dl.)	I Normal control Means ± SD (15 cases)	II Untreated diabetic patients Means ± SD (30 cases)	III Diabetic patients treated with *Coccinia indica* W.&A. Means ± SD (25 cases)
Blood Sugar			
Fasting	84 ± 8.11	160 ± 16.14	110 ± 10.69
Post meal	105 ± 9.31	360 ± 29.24 P<0.001	142 ± 14.21 P<0.001
Lipid			
a. Total Cholestrol			
	103 ± 11.0	278 ± 20.01 P<0.001	172 ± 12.72 P<0.001
b. Phospho lipid			
	149 ± 10.52	142 ± 14.31 P<0.005	148 ± 11.75 P<0.5
c. Triglyceride	88 ± 9.01	260 ± 18.91 P<0.001	140 ± 14.63 P<0.001
d. Free fatty Acid	18 ± 2.61	38 ± 5.93 P<0.001	22 ± 5.54 P<0.001

Table - II

Glucose tolerance test before and after treatment with *Coccinia indica* W.&A. and Diabenese

Sample	*Coccinia indica* W.&A. group			Diabenese group	
	Initial level of blood sugar in mgm/dl. mean ± SD of no. of sample (30)	After 6 week (N = 25)	After 12 weeks (N= 22)	Initial level of blood sugar mgm/dl. mean ± SD of no. of sample (15)	After 6 weeks (N = 15)
Fasting	160 ± 12.13	118 ± 11.05 P< 0.001	110 ± 9.19 P<0.001	165 ± 20.63	120 ± 16.25 P<0.1
After 1 hour glucose load	280 ± 19.13	132 ± 12.63 P< 0.001	128 ± 11.01 P<0.001	248 ± 26.41	138 ± 18.31 P<0.05
After 2 hour glucose load	308 ± 24.52	145 ± 14.06 P< 0.001	142 ± 14.11 P<0.001	292 ± 28.11	152 ± 20.16 P<0.05

diabetics. Hyperlipidemia is mainly correlated with the duration and severity of disease. Hyperlipidemia is a state of elevated level of blood lipids and is considered as sequel to diseased condition of the body. Hence, herbal therapy is adopted to extricate the disatrous sequel of hyperlipidemia in diabetics. It is encouraging to find that the extract of *Coccinia indica* W.&A. leaf has significantly lowered total cholestrol, phospholipid, triglycerides and free faty acid almost to normal range with the control of hyperglycemia at the end of six weeks.

Hypocholesterolemic effect may be due to presence of beta- sito- sterol, a plant sterol, in the leaf of *Coccinia indica* W.&A., beta- sito- sterol containing an ethyl group that may interfere with the absorption of cholestrol from the intestine in man. This results in increased faecal excretion of cholesterol. Significant change in phospholipids suggests that the mode of action of *C.indica* W.&A. in lowering cholesterol and phospholipid ratio in diabetics seems to be very much similar to the action of estrogen. The appearance of hyperlipidemia is recognised by the presence of large amount of triglycerides in diabetes. This may be the consequences of synthesis of triglyceride in large amount in the body exceeding the capacity of body to remove them. Inadequate Insulin availability enhances the mobilization of free fatty acid from fat depot for fuel supply when the body demands it. This results in increased level of serum free fatty acid in diabetes.

There was remarkable reduction in serum lipids and blood sugar in *Coccinia indica* W.&A. treated diabetic patients. This reduction was progressively increasing in successive weeks. It is evident from the result that *C. indica* W.&A. exerts its protective influence against hyperlipidemia with the control of hyperglycemia.

C. indica W.&A. hypoglycemic effect comparable with the effect of Diabenese treatment instituted in diabetic patients. The mode of action of trial drug can be hypothesised that the ingredients present in the extract may be acting like anabolic hormone insulin rather than stimulating beta cells, like biguanides.

Summary

Hyperlipidemia is almost prevalent among overweight diabetics. The purpose of this study was to observe the change in levels of lipid fractions in untreated diabetic patients. Considering these complications and difficulties in the managment of complexity of disease with modern drugs due to side effect, trials of *Coccinia indica* W.&A. (leaf extract) has been taken up on 30 non Insulin dependent diabetic patients. The drug was found to be significantly attenuated the lipid fraction almost to normal range with the control of hyperglycemia.

REFERENCES

Anonymous 1980 WHO Expert Committee on Diabetes Mellitus, Technical Report Series 646, Geneva.

Bever, B.O. and Zhand, G.R. 1979 Plants with Oral Hypoglycaemic Action, *Q.J. Crude drug research.* 17, 139-141.

Bloor, W.R. 1916 The Lipids of Blood in Diabetes. *J. Biol. Chem.* 26, 417-419.

Das, A. 1977 Bitters and diabetes. *Indian Drugs.* 14 (8), 168-169

Gupta, S.S. 1963 Effect of Indigenous Antidiabetic Drug Against Hypoglycaemic Response, *Indian Jour. of Med.* Res.51, 716.

Gupta, S.S. and Variyar, Mc.	1964	Experimental Studies on Pituitory Diabetes, part IV., effect of *Gymnema sylvestre* and *Coccinia indica* W.& A. against Hypoglycemic Response of Somatotropin and Corticotropin Hormones. *Indian Jour. of Med. Res.* 52: 200-204.
Kritikar and Basu	1933	*Indian medicinal plant.* Vol. II., Page 1053.
Khan, A.R., Khan, G.Y., Micheal, A and Quader, M.A.	1979	Effect of Guar Gum on Blood Lipids. *Am. J Clin. Nutr.* 34, 2446-9
Mukherjee, B.	1957	Indigenous Indian Drugs used in Treatment of Diabetes. *J. Scientific Indus research,* 16A, Suppl. 1-4
Man, G.V.	1955	Metabolism of Serum Lipids in Diabetes and Atherosclerosis *Diabetes* 4, 273-275.
Nadkarni, K.M.	1954	*Indian Materia Medica.* Vol I.
Pulok K. Mukherjee, Tejendra Bhaka, S., Pal, M. Pal., B.P., Saha, Achintya., K and Das.	1995	Anticholesterolaemic Activity of fraction of *Azardirachta indica* A. Juss., leaf extract on Rats, *Ancient Science of life,* 14 (3), 150-153.
Smith, V and Holm, G.	1982	Effect of Guar Gum Preparation on Glucose and Lipid Levels in Diabetics and Healthy Volunteers. *Atherosclerosis,* 45 (3), 1-10.

हिन्दी सारांश

मधुमेह में कोक्सिनिया इन्डिका डब्लू० एन्ड ए० का प्रभाव

एस०एम० काबले, जी०एस० ज्योतिषी, पी०एल० कमलाकर एवम् एस०एम० वैद्य

रक्तातिमेदस्विता मधुमेह में साधारणत: पाया जाता है। अचिकित्सित मधुमेह में यह उपद्रव बढ़ जाता है। मधुमेह के उपद्रवों तथा आधुनिक औषधियों के दुष्प्रभावों के कारण आयुर्वेदीय औषधियों की उपयोगिता का महत्व बढ़ जाता है। इसलिये व्याधि के क्लिष्ट सम्प्राति एवं संतोषजनक परिणाम के लिए 30 इन्सूलिन रहित चिकित्स्य रुग्णों पर कोक्सिनिया इन्डिका के पत्तो से बनाई गई घनवटी का निदान चिकित्सात्मक अध्ययन किया गया है। घनवटी के प्रभाव मधुमेह, चिकित्सा में उल्लिखित संदर्भो तथा जान्तव परिक्षणों में रक्तातिमेद तथा रक्तमाधुर्य के आधार पर इसका निदान चिकित्सात्मक परीक्षण किया गया। यह औषध व्याधि के मुख्य प्रभाव को संतुलित करके रक्तगत मधुरता के साथ रक्तातिमेदस्विता में भी कमी लाती हैं।