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(Research Article)

Hypoglycemic Effect of *Cocos nucifera* Flower Alcoholic Extract and Oil in Normal and Alloxanised Hyperglycemic Rats

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ABSTRACT

The objective of the present investigation was to study the efficacy of Cocos nucifera Linn. (Family – Arecaceae), when given as flower extract and fruit oil in normal as well as diabetic rats. Hypoglycemic effect was compared to that of Glibenclamide. The ethanolic extract of Cocos nucifera flowers and fruit oil was administered orally at a dose level of 300mg/kg body weight and compared their effect with Glibenclamide for chronic study (15 days). In the long term treatment of alloxan induced diabetic rats, the degree of protection was determined by measuring blood glucose, triglycerides, cholesterol and protein on 15th day. Cocos nucifera flower extract (CNFE) and coconut oil (CO) at a dose of 300 mg/kg body weight for 15 days, suppressed the elevated blood glucose and lipid levels in alloxan induce diabetic rats. Our findings indicated that the Cocos nucifera flower extract and coconut oil possess antihyperlipidemic effect in addition to anti-diabetic activity.

Key Words: *Cocos nucifera* Linn*;* Hypoglycemic effect; Diabetes mellitus; Ethanolic extract; Lipids; Glibenclamide.

INTRODUCTION

Diabetes mellitus is a major disease characterized by derangement in carbohydrate, fat and protein metabolism, affecting nearly 10% of the population[1]. There are two types of diabetes: Type 1 and Type 2. Type 1 is thought to be caused by a combination of genetic and environmental factors that results in a lack, or complete absence of insulin. However, the reasons are largely unknown as to why the body's immune system attacks itself, destroying over 90 % of its own insulin-producing β cells in the pancreas. Much more common, type 2 diabetes has been linked to obesity.

Treatment for type 1 continues to consist which insulin injections, although other strategies for taking insulin are currently being researched, type 2 requires medication and sometimes insulin injections. Both types require lifestyle changes that include diet and exercise[2].Treatment with insulin and/or oral hypoglycemics has several disadvantages and therefore there is need to develop better alternatives. Recently developed newer insulin are devoid of resistance development, a major advantage over conventional one, however their prohibitive costs make them inaccessible to many patients. In an attempt to develop newer, cheaper, and effective agents for diabetes, several plants have been investigated and reported to possess hypoglycemic activity e.g. *Ficus hispida*[3], *Ipomoea batatas* L.[4], *Aegle marmalos*[5], *Tinospora cordifolia* and *Sauropus androgynus*[6] etc. *Cocos nucifera,*commonly known as coconut tree, which has various parts which were used for different purposes such as in the treatment of diabetes, dysentery and leprosy[7].

MATERIALS AND METHODS

The fresh flowers of *Cocos nucifera* were collected from Bhor region and botanical identification was performed at Botanical Survey of India, Pune, India. All the protocols of animal experiments were approved by the Institutional Animal Ethics Committee.

Design of the Experiment

The study was carried out for 15 days to access the effect of various treatments, both in euglycemic and hyperglycemic rats.

The following were groups and their treatments:

1. Control (Vehicle) – 2% Tween-80.
2. Diabetic control (DC)
3. Glibenclamide (GLB)– 500 µg/kg
4. CNFE 300mg/kg – in hyperglycemic
5. CO – 300 mg/kg in hyperglycemic
6. CNFE – 300 mg/kg in euglycemic
7. CO – 300 mg/kg in euglycemic

The treatments were given for 15 days by administering orally on the last day of study (15th day). The food was withdrawn at 4 pm. The next day at 8.00 am, blood was withdrawn by cardiac puncture under anaesthesia. The

serums was obtained by centrifuging the blood at 3000rpm and were analyzed for blood glucose, HDL-cholesterol, total cholesterol, triglycerides and total proteins.

RESULTS

There was no significant decrease in blood glucose level of CNFE and CO treated group with mean values of 81.33±1.82 and 82.83±2.31 as compared with the mean value of 83.67±1.67 of normal control (NC) group.

On the last (15^{th}) day, there was significant ($p<0.0001$) decrease in blood glucose level of GLB, CNFE and CO treated groups with the mean values of 81.50±1.64, 102.50±2.76 and 109.30±4.38 respectively as compared with a mean value 316.30±4.09 of diabetic control (DC) group. The results of effect of flower extract and oil of *Cocos nucifera* Linn on Blood Glucose level before treatment and after treatment are summarised in Table-1.

There was significant ($p<0.001$) increase HDL-Cholesterol of GLB, CNFE and CO treated groups with the mean values 38.50±1.52, 38.00±2.67 and 35.50±1.47 as compared with the mean value 24.50±1.47 of diabetic control (DC) group.

There was significant ($p<0.001$) decrease in total cholesterol of GLB, CNFE and CO treated groups with the mean values 78.33±3.32, 62.33±1.38 and 64.33±5.12 as compared with mean value of 178.00±4.02 of diabetic control (DC) group. The results of effect of flower extract and oil of *Cocos nucifera* Linn. on HDL Cholesterol and Total Cholesterol in normal and alloxan induced diabetic rats are summarised in Table-2.

There was significant ($p<0.001$) decrease in Triglycerides of GLB, CNFE and CO treated groups with the mean value 135.50±2.17, 124.20±8.79 and 124.00±5.31 as compared with mean value 340.30±14.5 of diabetic control (DC) group.

There was significant ($p<0.001$) increase in total protein level of GLB, CNFE and CO treated group with the mean value of 8.36±0.16, 8.35±0.20 and 8.81±0.19 as compared to that of diabetic control group with a mean value of 4.95±0.07. Where there was significant ($p<0.05$) decrease in normal treated group CO with the mean value of 9.00±0.11 as compared with mean value 9.56±0.16 of normal control (NC) group. The results are summarised in Table-3.

Various treated euglycemic groups continued to gain weight while *Cocos nucifera* flower extract of coconut oil treated groups moderately gain the weight, diabetic control, Glibenclamide treated hyperglycemic rats continued to loose body weight(Table-4).

DISCUSSION

In the present study, the hypoglycemic and hypolipidemic activity of *Cocos nucifera* flower extract and fruit oil was evaluated in euglycemic and alloxan induced hyperglycemic waster albino rats. The study was carried out for 15 days (multiple doses).The effects of various treatments on blood glucose, lipids and total protein were investigated.

Euglycemic Rats

15 days treatment with alcoholic extract of *Cocus nucifera* flower and fruit oil (300 mg/kg) does not produced hypoglycemic effect, so these extracts are not showing effect as that of Glibenclamide. However, the treatments with CNFE and CO favorably alter plasma lipid profile and total proteins.

Hyperglycemic Rats

Alloxan induced hyperglycemic rats when treated with Glibenclamide, CNFE and CO produced significant hypoglycemia. Significant change in lipid profile and total proteins was also seen in CNFE and CO treated hyperglycemic rats.

It is well known that control of diabetes mellitus improves general well being, food intake and body weight gain. Hyperglycemic animals treated with CNFE and CSO continued to gain weight as compared to untreated diabetic control.

Findings of the present study clearly indicates that CNFE and CO are effective in controlling hyperglycemia and favorably altering the blood lipid profile.

It is very difficult to comment on mechanism of hypoglycemic activity of CNFE and CO, however considering the rich content of flavonoides in CNFE, the observed hypoglycemic activity in the present study could be attributed to the antioxidant activity of bioflavonoides. Several biflavonides have been reported to produce antioxidant activity[8] but there are scanty reports regarding antioxidant activity of CNFE fruit.

The hypoglycemic activity of coconut oil seen in this study could be due to the fatty acids present in the oil. It is reported that monosaturated fatty acids improved β-cell secretory function by preventing β-cell apoptosis, decrease β-cell proliferation and impairment of β-cell function[9].

The CNFE and CO has not produced hypoglycemia in Euglycemic animals. This may relate to Biguanides. So the mechanism of action may be due to increased glycolysis at peripheral tissues by potentiating the action of insulin at the target cell as that of Biguanides[10].

However, the present study strongly recommends clinical trials to establish its role in the treatment of diabetes and its complications, if not an alternative to insulin or oral hypoglycemic agents at least as an adjuvant.

Table 1: Effect of Flower Extract and Oil of *Cocos nucifera* Linn on Blood Glucose Level before Treatment and after Treatment

Groups	Blood Glucose Level Before Treatment	Blood Glucose Level After Treatment
Normal Control (Nor)	84.33±2.69	83.67±1.62
Diabetic Control	329.3±5.06	316.3±4.09
Glibenclamide (Glib)	332.3±4.93	81.5±1.64***
Glib +CNFE	330.8±7.55	102.5±2.76***
Glib + CO	327.7±5.54	109.3±4.38***
Nor + CNFE	80.67±1.56	81.33±1.82
Nor + CO	82.67±2.92	82.83±2.31

Table 2: Effect of Flower Extract and Oil of *Cocos nucifera* Linn. on HDL Cholesterol and Total Cholesterol in Normal and alloxan induced diabetic Rats

Groups	HDL Cholesterol	Total Cholesterol
Normal Control (Nor)	43.5 ±0.76	67.67±1.43
Diabetic Control	24.5 ±1.47	$178.0±4.02^{C}$
Glibenclamide (Glib)	38.5 ±1.52	$78.33±3.32^{Z}$
Glib +CNFE	$38.0±2.67^{Z}$	$62.33±1.38^{Z}$
Glib + CO	$35.5±1.47^{Z}$	$64.33±5.12^{Z}$
Nor + CNFE	41.5±0.84	64.0±1.78
Nor + CO	42.17±0.94	69.5±3.42

Table 3: Effect of Flower Extract and Oil of Cocos nucifera Linn. On Triglycerides and Total Protein in Normal and alloxan induced Diabetic Rats

Groups	Triglycerides	Total Protein
Normal Control (Nor)	100.8 ±2.49	9.56±0.16
Diabetic Control	340.3 ±14.5^{C}	4.95±0.07^{C}
(Glibenclamide (Glib)	135.5 ±2.17	8.36±0.16^{Z}
Glib +CNFE	124.2 ±8.79^{Z}	8.35±0.20^{Z}
Glib + CO	124.0 ±5.31^{Z}	8.81±0.19^{Z}
Nor + CNFE	100.5 ±2.32	9.55±0.07
Nor + CO	100.0 ±2.29	9.0±0.11^{a}

Table 4: Results of Body Weight Changes

Groups	Difference
Normal Control (Nor)	+7.00 ± 0.02
Diabetic Control	-34.80 ± 0.37
(Glibenclamide (Glib)	-2.40 ± 1.29
Glib +CNFE	+6.2 ± 0.72*
Glib + CO	+5.10 ± 1.13*
Nor + CNFE	+6.1 ± 0.07*
Nor + CO	+9.6 ± 0.24**

CONCLUSION

The data in our study suggests that *Cocos nucifera* flower extract and coconut oil having beneficial effects in established diabetes mellitus and it may also delay or prevent the onset of the disease.

The ethanolic extract of *Cocos nucifera* flower and coconut oil may contain antidiabetic principles that directly influence hepatic or peripheral glucose disposal and that regulating carbohydrate absorption and also favorably altered the blood lipid profile, total protein and body weight. Thus *Cocos nucifera* flower extract and coconut oil deserves further consideration as a possible adjunct to conventional antidiabetic treatment and as a source of new hypoglycemic compounds.

REFERENCES

1) Venkatesh S, Reddy GD, Reddy BM, Lakshman M. Antidiabetic activity of *Helicteres Isora* root. http://www.ayurvedam.com/pdf/antidiabetic.pdf.
2) Health Education. Diabetes – An overview. Jan 2005, 12-40.
3) Ghosh R, Sharatchandra KH, Rita S, Thokchom IS. Hypoglycemic activity of *Ficus hispida* (bark) in normal and diabetic albino rats. Indian J Pharmacol 2004; 36(4):222-5.
4) Kusano S, Abe H. Antidiabetic activity of white skinned sweet potato (*Ipomoea batats* L.) in obese zucker fatty rats. Biol Pharm Bull 2000; 23(1):23-6.
5) Ponnachan PTC, Paulose CS and Panikkar KR. Effect of leaf extract of *Aegle marmelose* in diabetic rats. Indian J Exp boil 1993; 31:345-7.
6) Sai KS, Srividya N. Blood glucose lowering effect of leaves of *Tinospora cordiofolia* and *Sauropus androgynus* in diabetic subject. J Nat Remed 2002; 2(1):28-32.
7) Kirtikar KR, Basu BD. Indian Medicinal Plants. 2nd ed. Dehradun: International Book Distributors, Vol. IV, 1999; p. 2580-5.
8) Naik SR. Antioxidants and their role in biological functions: An overview. Indian Drugs 2003; 40(9):501-512.
9) Maedler K, Oberholzer J, Bucher P, Spinas GA and Donath MY. Monounsaturated fatty acids prevent the deleterious effects of palmitate and high glucose on human pancretic β-cell turnover and function. Diabetes 2003; 52:726-733.
10) Chaudhari SK. Quintessence of Medical Pharmacology. New Central Book Agency (P) Ltd., Calcutta, 1st edn, 1997; p.719.

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