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ANTIDIABETIC ACTIVITY OF *CISSUS ROUTNDIFOLIA* LEAVES SUPPLEMENT

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ABSTRACT

Botanical supplement *Cissus rotundifolia* (CR) belongs to Vitaceae, and has been used traditionally in Yemen. Distribute widely in Yemen regions. (CR) has been proposed to contain bioactive components having anti-diabetic properties such as flavonoid, hydrolysable tannin, antioxidants and vitamin C. They contain an appreciable amount of protein, fat, crude fiber and minerals. protein fraction contains a relatively high level of essential amino acids; fat contains a high concentration of unsaturated fatty acids; Macroelements (Magnesium, Sodium, Potassium; Microelements (Iron, Zinc, Manganese, Copper and Chromium. This study was designed to assess the efficacy and safety of (100 g & 50 g CR/patient) feeding with fresh boiled leaves for eighteen patients compared with glibenclamide drug. Hypoglycemic effects of (CR) were also investigated in diabetic patients. (CR) and the standard drug glibenclamide were orally administered daily to diabetic patients for 10 days. Blood glucose, enzymes transaminase (ALT & AST) and kidney functions levels were determined. The results have shown hypoglycemic activity in diabetic patients. **Conclusion:** The antihyperglycaemic activity of (CR) may probably due to the presence of several phytochemicals belonging to properties antidiabetic effect.

KEYWORDS: *Cissus rotundifolia*, botanical supplement, hypoglycemic, diabetic patients.

INTRODUCTION

Type II diabetes mellitus, an endocrine and metabolic disease caused by the combined effects of polygenetic and environmental factors, accounts for more than 90 percent of all diabetic patients.[1] Globally an estimated 422 million adults were living with diabetes in 2014 compared to 108 million in 19801.[2] Natural food products have been used for combating human diseases for thousands of years.[3] Cissus rotundifolia belongs to family vitaceae genus cissus.[4] CR is found throughout East Africa, Zimbabwe, Mozambique, South Africa, parts of Central Africa, Egypt and the Arabian Peninsula.[5] CR commonly called in Yemen alhals, alfaq; used as herbal product.[6] In Yemen the boiled leaves are eaten with meals.[4] In the southern region of Saudi Arabia, their leaves are widely consumed after cooking by local people as leafy vegetables.[7]

Ethnobotincal Studies indicates to uses drug for the treatment of malaria, fever, wounds, Ear pain, gall bladder diseases, against faint, and improve appetite.[8,9,10,4] In Africa CR is used for treating dysentery with blood, amoebic, stomachache, coughing with blood or losing weight, joint and pains.[11] [12] In Nigeria The dietary management and prevention of diabetes.[13]

Biological studies reported on spices *cissus routndifolia* used for treating malaria[14,15] Analgesic, anti-inflammatory, antiulcerative, antioxidant and hepatoprotective activity[16,17,18]; Anti-diabetic activity.[19] [20] [21]

Phytochemical screening of *cissus rotundifolia* extracts is steroids, flavonoids, proteins.[15] *β*-sitosterol, Magnificol, *β*-sitosterol-Dglucoside, Quercetrin, Linarin, Quercetin, Isoorientin and Vitamins C & E.[21] Nutritional evaluation of wild plant *Cissus rotundifolia* showed that it contains an appreciable amount of protein, fat, crude fiber and minerals. protein fraction contains a relatively high level of essential amino acids; fat contains a high concentration of unsaturated fatty acids; Macroelements (Magnesium, Sodium, Potassium and Microelements (Iron, Zinc, Manganese, Copper, Chromium.[7]

The objective of this study was to assess the evaluation of supplementary boiled leaves' of *cissus rotundifolia* activity against diabetic patients (type 2).

MATERIALS AND METHODS

Plant material

The leaves of *Cissus rotundifolia* were collected from Lahj governorate Yemen. plant was identified and authenticated by Department of Botany faculty of science of Aden University, Yemen.

Preparation of fresh leaves of *Cissus rotundifolia*

Fresh leaves were collected in the morning from alkofeeg village, Toorelbaha, Lahj, Yemen. they washed 1 kg of fresh leaves from *C. rotundifolia*. and were added to 2 L of water. the leaves were heated for 25 minutes **(**Fresh leaves was prepared each day).

Design of Experiment

Eighteen diabetic patients were divided randomly into three groups comprising of six male diabetic patients who, were administered orally in fresh boiled leaves daily under the supervision of a physician.

Group 1: diabetic patients, received (100g CR) for 10 days.

Group 2: diabetic patients, received (50g CR plus 5 glibenclamide) for 10 days.

Group 3: diabetic patients, received (5 mg glibenclamide) for 10 days.

Determination of blood glucose levels

Blood glucose concentrations (mg/dl) were determined using an ACCU CHEK before supplementation by CRL and after supplementation at 60 min, 120 min, a day, 5 days and 10 days.

Determination of Urea, ALT, AST levels

Serum: Urea, ALT, AST, levels were determined using Randox diagnostic kits.

Urea, ALT, AST, levels were estimated before supplementation by CRL and after supplementation at, day, a 5 days and 10 days.

Statistical analysis

The results are expressed as mean± S.D. The statistical analysis was carried out using paired t-test and one-way analysis (ANOVA). Statistical P value <0.05 was considered to be significant.

RESULTS

Effects of supplementation with CRL on glucose levels

The results in table (1) shows increase in concentration levels of glucose in all groups patients diabetic before feeding with CRL, 100 g of CRL alone plus 2.5 mg glibenclamide for a period of 10 days which showed a significant decrease in the blood glucose level in diabetic patients.

Effects of supplementation with CRL on (UREA, ALT, AST) levels

Table (2) shows a significant increase levels of serum: urea, ALT, AST in all groups of diabetic patients before supplement with CRL. diabetic patients who administrated CRL showed a significant decrease in urea, ALT, AST serum.

Table (1): Effects of CRL supplementation on glucose levels.

Time Of Feeding / Method Of Treatment	Before Feeding	After Feeding 60 Min	After Feeding 120 Min	After Feeding Day1	After Feeding Day 5	After Feeding Day10
Received in 100g CRL	173.17±10.15	155.50±10.13	143.33±8.61	133.17±4.60	127.17±3.97	122.83±4.40
Received 50g CRL plus 5 mg glibenclamide	177.50±8.76	157.67±9.152	144.83±9.152	135.00±7.043	121.83±10.245	114.67±9.953
Received 5 mg glibenclamide	166.33±12.87	147.000±7.483	136.67±4.46	131.167±6.370	133.500±4.506	131.000±3.225

Table (2): Effects of CRL supplementation on (urea, ALT, and AST) levels.

Time of Feeding / Method of Treatment	Parameters	Before Feeding	After Feeding Day1	After Feeding Day5	After Feeding Day10
Received in 100g CRL	AST UI/L	19.67±2.16	19.5±1.87	19.17±1.94	17.50±2.07
	ALT UI/L	15.00±1.10	14.67±1.37	14.17±.98	13.33±1.03
	UREA mg/dl	22.17±2.56	22.00±2.19	21.17±2.48	20.83±2.14
Received 50g CRL plus 5 mg glibenclamide	AST UI/L	18.83±4.07	20.67±2.42	19.33±3.01	19.50±2.17
	ALT UI/L	13.33±1.51	13.67±1.37	13.33±1.03	12.33±.52
	UREA mg/dl	23.67±3.39	23.33±2.73	23.33±3.20	22.67±2.79
Received 5 mg glibenclamide	AST UI/L	22.33±2.80	22.00±2.83	221.67±2.58	21.83±3.43
	ALT UI/L	14.17±1.47	14.17±1.47	14.67±1.37	14.67±2.25
	UREA mg/dl	19.67±2.94	20.17±2.48	20.33±2.73	20.33±2.07

DISCUSSION

Historically all medicinal preparations were derived from plants.[23] Several plants possess high hypoglycaemic properties and as such are potential sources of new drugs to support

existing oral hypoglycaemic agents in the scientific and popular literature as having anti-diabetic activity.[24] *Cissus routndifolia* with a long history in traditional medicine in Yemen and other countries.[4,6,7,8,9,10,15,16,17,18,19,37]

The dietary intake of phytochemical could be a promising strategy for diabetes prevention[25],. where numerous studies reported that they are rich in phenolic compounds and have a high nutritional value. The studies found that the phenolic compound are diabetes treatment or the reduction of risk disease[26], and enhancing insulin activity.[27] β-sitosterol, quercetin, zinc, Vit. C,β-sitosterol reduced levels of glucose.[28] Numerous studies have focused on quercetin to develop it as antidiabetic drug to prevent and manage DM.[29] Several studies have reported quercetin mechanism of action in diabetes, such as inhibition of insulin-dependent activation of PI3K, and reduction in intestinal glucose absorption by inhibiting GLUT2.[30]

Zinc plays a variety biological roles in the control of diabetes, including the regulation of glucose transport, and insulin synthesis, secretion and storage.[31,32] Treatment with Zn supplements in T2DM patients has produced little benefit in the control of blood glucose.[33]

Cissus routndifolia also contains major mineral elements such as Calcium, Potassium, Sodium which might also play a contributory role in enhancing medicinal properties such as the hypoglycemic properties.[34]

The activities of AST and ALT significantly increased in diabetic patients compared to controls (Table 2). These activities decreased significantly after the supplementation the diet CRL of diabetic patients. showed elevated levels of their ALT and AST, indicating that *C. rotundifolia* did not exert any hepatoprotective effect.[35] Linarin found in the leaves might be useful as potential pharmacological option for preventing fulminant hepatic failure.[36]

Generally The antihyperglycaemic activity of CRL may probably due to the presence of several phytochemicals belonging to properties antidiabetic effect.[16,19,21,37]

CONCLUSION

The supplementation with *Cissus rotundifolia* leaves didn't cause any signs of clinical abnormalities in the feeding diabetic patients. Thus, the feeding leaves given appear to be safe and in controlling blood glucose level, as the hyperglycemic condition of the diabetic patients groups reduced significantly compared with before supplementation with CRL. The

possible mechanism of antidiabetic activity may probably due to effects of synergistic for several phytochemicals contains of the leaves.

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