Academic Sciences International Journal of Pharmacy and Pharmaceutical Sciences

ISSN- 0975-1491 Vol 4, Suppl 1, 2012

Research Article

ANTIDIABETIC ACTIVITY OF AQUEOUS EXTRACT OF *CORIANDRUM SATIVUM* L. FRUITS IN STREPTOZOTOCIN INDUCED RATS

KAMRAN JAVED NAQUVI*, MOHD. ALI, JAVED AHAMAD

Phytochemistry Research Laboratory, Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia Hamdard, New Delhi 110062, India. Email: kjnaquvi@gmail.com

Received: 4 Oct 2011, Revised and Accepted: 13 Nov 2011

ABSTRACT

The antidiabetic activity of aqueous extract of *Coriandrum sativum* L. (Apiaceae) has been studied on streptozotocin induced diabetic rats. In doses of 250 mg/kg and 500 mg/kg the aqueous extract showed significant decrease in blood glucose level. It also decreased total cholesterol level and increased high density lipid cholesterol significantly.

Keywords: Coriander, Streptozotocin, Diabetes mellitus, Cholesterol, Lipid profile.

INTRODUCTION

Coriandrum sativum L. (Apiaceae) is an annual herb native to Mediterranean region. It is commercially grown in India, Morocco, erstwhile USSR, Hungary, Poland, Romania, Mexico and USA. India is the largest producer of coriander in the world. Major production centers are Rajasthan, Maharashtra, Gujarat, and Karnataka[1]. The fruits are gathered ripe in late summer[2, 3]. The fragrant odour and pleasant aromatic taste of coriander is due to the presence of the essential oil which is about 1 per cent in seeds. The chief constituent of oil is (+) linalool (coriandrol)[4]. The fruits are given in spermatorrhoea, leucorrhoea and in rheumatic fever. Dried seeds are reported to possess diuretic and aphrodisiac properties[5]. It has traditionally been referred to as antidiabetic[6], anti-inflammatory and cholesterol lowering[7, 8]. It is also reported to have antimicrobial[9, 10], anthelmintic[11], antioxidant[12], antifertility[13], antiproliferative[14], anticonvulsant[15], diuretic[16], antiulcer[17], hepatoprotective[18], antifeedent[19], asthmatic[20] and larvicidal activities[21]. The present paper described antidiabetic activity and lipid profile of aqueous extract of the fruits of *C. sativum* in rats.

MATERIAL AND METHODS

Plant Material

The fruits of *Coriandrum sativum* were collected from the Kendriya Bhandar, Jamia Hamdard campus, New Delhi. The plant was identified by Prof. M. P. Sharma, Taxonomist, Department of Botany, Faculty of Science, Jamia Hamdard, New Delhi. A voucher specimen (PRL/JH/28/07) of drug is preserved in the Phytochemistry Research Laboratory, Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia Hamdard.

Preparation of the Extracts

The air dried powdered drug (500 g) was extracted with water in a Soxhlet apparatus for 6 hour. Aqueous extract of the plants was evaporated to dryness under pressure to give solid residue. The residue was stored at 0 - 4 °C for subsequent experiment.

Animals

Wistar albino rats (150-200 g) were obtained from Central Animal Facility, Jamia Hamdard University and maintained in 25 ± 1°C, with 55 ± 5 % humidity with 12 hr light/dark cycle. The animals were given standard pellet diet (Lipton rat feed, Ltd., Pune) and water *ad libitum* throughout the experimental period. The Institutional Animal Ethics Committee approved (173/CPCSEA/JH/No.483) the experiments. All the extracts and the standard drugs were administered orally.

Chemicals

All chemicals and reagents used were of analytical grade. Streptozotocin (STZ) (Spectrochem Pvt. Ltd. Mumbai, India) was obtained from Chopra chemicals (Delhi, India).

Drugs

Standard drug: Glimepiride prepared in Tween 80 solution (1 %); Test drug: plant extract, in CMC (1 %) solution.

Induction of Diabetes

The animals were fasted for 16 hour prior to the induction of diabetes. STZ freshly prepared in citrate buffer (pH 4.5) was administered i.p. at a single dose of 50 mg/kg. Development of diabetes was confirmed by polydipsia, polyurea and by measuring blood glucose concentrations 72 hour after injection of STZ. Rats with blood glucose level of 250 mg/dl or higher were considered to be diabetic and selected for experiment. Diabetic animals were randomly assigned to groups. Group I contained normal animals and served as normal control. Group II served as diabetic control (toxic). Groups I and II received vehicle during the experiments, while the Group III received the reference standard drug glimeperide (0.1 mg/kg) and groups from IV to V received the aqueous extracts of coriander fruits 250 mg/kg (CS_1) and 500 mg/kg (CS_2), respectively.

Biochemical Estimation

Initial, 8th 14th and 21st day non fasting blood glucose levels were determined just before administering the drugs. On the last day of experiment, blood samples were collected from tail vein from each animal. Serum was separated from the blood by centrifuging at 3000 rpm for 20 minutes for biochemical estimations of total cholesterol (TC) and high density lipid cholesterol (HDL- C)[22, 23].

Estimation of Blood Glucose

The blood glucose level was estimated with One Touch Basic Glucometer (Accu Chek Active, Roche, Germany). Serum total cholesterol (TC), high-density lipid cholesterol (HDL-C), was estimated by using standard enzymatic colorimetric kits (Span diagnostic Ltd. Surat, India).

Statistical Analysis

Values are expressed as mean ± standard error of the mean. Statistical significance was calculated by using one-way analysis of variance (ANOVA) followed by Dennett's t- test. The values were considered statistically significant when the P- value was less than 0.05 ($P<0.05$). (Table 1 and table 2)

RESULTS AND DISCUSSION

The perusal of data revealed that the aqueous extract of fruits of *C. sativum* decreased the blood glucose level statistically significant (Table 1) when compared with diabetic control[24]. The 500 mg/kgbw dose was found better than 250 mg/kgbw however, the standard glimepiride was better in comparison to both doses. Treatment with aqueous extract decreased total cholesterol level and increased high density lipid cholesterol level, which was statistically significant when compared with normal control[25] (Table 2). The above findings justified the antidiabetic activity of fruits of *C. sativum* which proved the traditional claim of antidiabetic activity of the aqueous extract.

Table 1: Effects of aqueous extract of coriander fruits on blood sugar level

Treatment	Blood glucose level in mg/dl			
	1st day	8st day	14st day	21st day
Normal; (I)	113.83±4.79*	115.67±1.02*	115.50±1.56*	118.50±1.15*
(STZ); 50 mg/kg; (II)	368.33±5.05	373.50±1.76	367.33±3.22	375.33±4.46
(Glimeperide); 0.1 mg/kg; (III)	374.67±5.06	161.33±2.21*	124.67±1.80*	104.50±3.12*
CS_1; (IV)	368.67±7.28	183.83±4.29*	165.50±4.26*	136.83±1.99*
CS_2; (V)	361.83±14.72	180.50±3.07*	157.83±5.28*	128.67±2.40*

All values are Mean ± SEM; n=6

* P<0.01 compared with diabetic control (II)

Table 2: Effect of aqueous extracts of coriander fruits on lipid profile

Groups	Treatment	Lipid Profile	
		TC	HDL-C
I	Normal	114.17±2.84*	47.50±1.18*
II	STZ; 50 mg/kg	252.83±2.70*	35.67±0.42*
III	Glimeperide; 0.1 mg/kg	113.00±2.37	44.33±0.95
IV	CS_1; 250 mg/kg	135.50±1.88*	33.67±1.15*
V	CS_2; 500 mg/kg	125.17±2.17*	39.33±0.98*

All Values are Mean ± SEM; n=6

*P<0.01 when compared with normal control group

REFERENCES

1. Anonymous, Wealth of India, Raw Material IV: Publication and Information Directorate, CSIR, New Delhi, 2002; pp. 24-26.
2. Robert B. Medicinal Plants II: Asiatic Publishing House, Delhi, 1999; pp. 133.
3. Andrew C. A Dorling Kindersley Book: The Encyclopedia of Medicinal Plants. 2002; 193.
4. Honda SS, Kapoor VK. Pharmacognosy. Vallabh Prakashan, Delhi, 1999; pp. 133-134.
5. Rastogi RP, Mehrotra BN. Compendium of Indian medicinal plants II, CSIR; New Delhi, 1991; pp. 212.
6. Gray AM, Flatt PR. Insulin-releasing and insulin-like activity of the traditional anti-diabetic plant *Coriandrum sativum* (coriander). British J Nutr 1999; 81(3): 203-209.
7. Chithra V, Leelamma S. Hypolipidemic effect of coriander seeds *(Coriandrum sativum*): mechanism of action. Plant Foods Hum Nutr 1997; 51(2): 167-172.
8. Lal AA, Kumar T, Murthy PB, Pillai KS. Hypolipidemic effect of *Coriandrum sativum* L. in triton-induced hyperlipidemic rats, Indian J Exp Biol 2004; 42(9): 909-912.
9. Delaquis PJ, Stanich K, Girard B, Mazza G. Antimicrobial activity of individual and mixed fractions of dill, cilantro, coriander and eucalyptus essential oils; Int J Food Microbiol 2002; 74(1-2): 101-109.
10. Arak E, Orav A, Raal A. Composition of the essential oil of *Coriandrum sativum* L. seeds from various countries. European J Pharmaceut Sci 2007; 32(1): 521-522.
11. Equale T, Tilahun G, Debella A, Feleke A, Makonnen E. *In-vitro* and *in-vivo* anthelmintic activity of crude extracts of *Coriandrum sativum* against *Haemonchus contortus*. J Ethnopharmacol 2007; 110(3): 428-33.
12. Hashima MS, Lincya S, Remyaa V, Teenaa M, Anilab L. Effect of polyphenolic compounds from *Coriandrum sativum* on H_2O_2-induced oxidative stress in human lymphocytes. Food Chem 2005; 92(4): 653-660.
13. Al-Said MS, Al-Khamis KI, Islam MW, Parmar NS, Tariq M, Ageel A M. Post-coital antifertility activity of the seeds of *Coriandrum sativum* in rats. J Ethnopharmacol 1987; 21(2): 165-173.
14. Nakano Y, Matsunaga H, Saita T, Mori M, Katano M, Okabe H. Antiproliferative constituents in Umbelliferae plants II. Screening for polyacetylenes in some Umbelliferae plants, and isolation of panaxynol and falcarindiol from the root of *Heracleum moellendorffii*. Biol Pharm Bull 1998; 21(3): 257-261.
15. Emamghoreishi M, Heidari-Hamedani G. Anticonvulsant effect of extract and essential oil of *Coriandrum sativum* seed in concious mice. J Ethnopharmacol 2005; 96(3): 365-370.
16. Aissaoui A, El-Hilaly J, Israili ZH, Lyoussi B. Acute diuretic effect of continuous intravenous infusion of an aqueous extract of *Coriandrum sativum* L. in anesthetized rats. J Ethnopharmacol 2008; 115(1): 89-95.
17. Al-Mofleh IA, Alhaide AA, Mossa JS, Al-Sohaibani MO, Rafatullahnd S, Quresh S. Protection of gastric mucosal damage by *Coriandrum sativum* L. pretreatment in Wistar albino rats. J Ethnopharmacol 1995; 48(1): 53-57.
18. Usha SS, Vilasrao JK, Rumi G. Hepatoprotective activity of Livobond a polyherbal formulation against CCl_4 induced hepatotoxicity in rats. Int J Pharmacol 2008, 4(6): 472- 478.
19. Birkett MA, Dodds CJ, Henderson IF, Leake LD, Pickett JA, Selby, MJ, Watson P. Antifeedant compounds from three species of Apiaceae active against the field slug *Deroceras reticulatum* (Muller). Chem Ecol 2004; 30(3): 563-576.
20. Sastre J, Olmo M, Novalvos A, Ibanez D, Lahoz C. Occupational asthma due to different spices. Allergy 1996; 51(2): 117-120.
21. Harve G, Kamath V. Larvicidal activity of plant extracts used alone and in combination with known synthetic larvicidal agents against *Aedes aegypti*. Indian J Exp Biol 2004; 42(12): 1216-1219.
22. Demacher PN, Himans AG. Measurement of total cholesterol in serum. Comparison of six isolated method combined with enzyme cholesterol analysis. Clinica Chemica 1977; 24: 1780.
23. Ramadan M, Amer M, Awad A. Coriander (*Coriandrum sativum* L.) seed oil improves plasma lipid profile in rats fed a diet containing cholesterol. European Food Res Tech 2008; 227(4): 1173-1182.

24. Suresh J, Ramachandra S, Kharya MD. Influence of itraconazole on antidiabetic effect of thiazolidinedione in diabetic rats. Int J Pharmacy Pharmaceut Sci 2009; (1):119-124.

25. Venu P, Rema R, Hariprasad MG. Evaluation of the antihyperlipidemic, cardioprotective activity of a polyherbal formulation. Int J Pharmacy Pharmaceut Sci 2010; 2(1): 86-91.