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SHORT COMMUNICATION

Effect of Flavonoid Fraction of *Cardiospermum halicacabum* Leaves on Lipid Levels in Streptozotocin (STZ) Induced Diabetic Rats

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Abstract

Cardiospermum halicacabum, an Indian medicinal plant, has been studied for its role in diabetes and its effect on lipid profile. This study was done to explicate whether treatment of *C. halicacabum* leaves flavonoid portion after streptozotocin (STZ) induced diabetes has hypolipidemic action or not. The experiment involved four groups of rat; first group was control group, second diabetic control, third diabetic induced received flavonoid fraction of *C. halicacabum* and fourth diabetic induced, is positive control which received glibenclamide. Blood was collected by retro-orbital puncture to quantify serum triglyceride, total cholesterol, HDL-cholesterol, LDL-cholesterol levels. Serum lipid profile parameters such as total-cholesterol, triglyceride, low-density lipoprotein and very low-density lipoprotein cholesterol were elevated, whereas, the level of HDL-cholesterol was reduced significantly ($P<0.05$) in diabetic rats. Flavonoid fraction of *C. halicacabum* after induction of diabetes, normalized glucose level and lipid profile. It can be concluded that hyperlipidemic profile of STZ-induced diabetic rats can be improved by treatment with flavonoid fraction of *C. halicacabum*.

Keywords: *Cardiospermum halicacabum*, flavonoid, diabetes, streptozotocin, lipid profile, glibenclamide.

Introduction

Diabetes mellitus affects whole body characterized by hyperglycemia and lipoprotein abnormalities (Scoppola *et al.,* 2001). These conditions are said to damage cell membranes which results in elevated production of reactive oxygen species. India is one of the oldest, richest and diverse cultural traditions associated with the use of the plants and herbs. Many of the ingredients used in cooking in Indian dishes have medicinal properties. In spite of considerable progress in using expensive synthetic drugs, the search for herbal remedies is growing which can be accounted for the effectiveness, minimal side effects in clinical experience and relatively low cost of the herbal drugs. Last few years, there has been a growing interest in the herbal medicine and herbal drugs or their extracts are prescribed widely, even when their biological active compounds are unknown (Valiathan, 1998; Modak *et al.,* 2007). Many minor components of foods, such as secondary plant metabolites, have been shown to reduce the risk of chronic diseases in humans. In this study, we have evaluated the hypolipidemic effect of flavonoid fraction of *C. halicacabum* leaves.

Materials and methods

Plant material: Cardiospermum halicacabum was collected in March 2006 from the Kongunadu Arts and Science College campus (Bharathiar University, Coimbatore, India) in March 2005 and was identified by Dr. V.S. Ramachandran, Dept. of Botany of the same institute. Voucher specimen was deposited, with the accession No.958.

Mature fresh leaves of the plant were dried at 40ºC for 3 d and powdered. The leaf powder was washed in hexane 2-3 times and then soaked in 70% methanol for 1 h. The supernatant which is flavonoid fraction (FF) was separated and dried under vacuum.

Experimental animals: Female Wistar albino rats with average weight of 140-160 g were purchased from Kerala Veterinary College, Thrissur. The animals were fed with commercially available “Gold Mohur Feed” and water was given *ad libitum*. The animals were housed at 27±2°C and 55% in humidity and a 12 h light/12 h dark cycle. The experiments were conducted according to the ethical norms approved by the Ministry of Social Justices and Empowerment, Government of India and Institutional Animal Ethics Committee Guidelines (Approval No. 659/02/a/CPCSEA).

Experimental design: The animals were fasted overnight (14-16 h) before induction of diabetes by streptozotocin (STZ). The animals of experimental groups II, III, and IV were injected with 50 mg/Kg bodyweight (bw) of freshly prepared STZ intraperitoneally, by dissolving in citrate buffer (0.01 M, pH 4.5). An equal volume of citrate buffer was administered to control group (Group I). On 4th post-induction day, diabetes was confirmed by measuring fasting blood glucose levels (>200 mg/dL). Rats were divided into 4 groups, each of 6 animals. Treatment started 3 d after inducing diabetes for 30 d.
Group I: Control
Group II: Diabetes mellitus induced group

Table 1. Effect of *C. halicacabum* flavonoid fraction on streptozotocin-induced diabetes rats serum lipid profile.

Groups	Total cholesterol (mg/dL)	Triglycerides (mg/dL)	HDL cholesterol (mg/dL)	LDL cholesterol (mg/dL)
Control	104.50±8.24[a]	97.23±8.54[a]	43.13±2.43[a]	61.85±5.12[a]
Diabetes control	159.29±7.67[b]	152.87±9.62[b]	22.39±2.22[b]	89.93±7.40[b]
Positive control	106.66±7.80[a]	100.88±7.71a	41.70±3.48[a]	59.88±4.15[a]
FF treated	102.15±8.55[a]	99.82±5.88[a]	42.55±4.17[a]	61.35±6.11[a]

Values are expressed as mean±SD {n=6} in each group; Values not sharing a common superscript letter differ significantly at p<0.05 (DMRT).

Group III: Treatment group, diabetic rats were orally administered FF at 100 mg/ Kg BW.
Group IV: Positive control, diabetic rats were orally administered glibenclamide at 500 µg/Kg BW.

Biochemical studies: The animals were sacrificed at the end of the treatment period. For estimating serum lipid profile, serum was isolated from the blood collected on 40th d of *C. halicacabum* leaf flavonoid fraction treatment and serum total cholesterol (TC), triglyceride (TG) and HDL-cholesterol were estimated by using diagnostic kits (Transasia Bio-Medicals Ltd., India). LDL cholesterol was arrived by calculation.

Statistical analysis: All values were expressed as the mean obtained from the number of experiment (n). Data from all the tables of normal animals, diabetic control animals, reference drug treated and FF treated animals were compared by ANOVA followed by Duncan's Multiple Range Test (DMRT)

Results and discussion

The levels of lipid parameters such as total cholesterol, TG, HDL and LDL in serum of normal and STZ-induced diabetic rats are shown in Table 1. The levels of total cholesterol, TG and LDL levels were increased significantly and decrease in the levels of HDL was noted. Oral administration of FF (100 mg/kg/bw) for a period of 30 d significantly decreased the levels of total cholesterol, TG, and LDL-cholesterol and increased the levels of HDL in STZ-induced diabetic rats. Lipid profile, which is altered in the serum of diabetic patients (Orchard 1990; Betteridge, 1994; Harbilas *et al*., 2013), seems to be a significant factor in the development of premature atherosclerosis and includes an increase in triglyceride and total cholesterol levels. In this study, FF significantly reduced the triglyceride levels in treated diabetic rats when compared to untreated diabetic rats. Earlier research studies (Venkatesh Babu and Krishnakumari, 2005) done by the author on this plant *C. halicacabum* leaves have shown presence of rutin to an extent of 1.5% dry weight. Rutin which possess hypoglycaemic effect could possibly attribute this property to *C. halicacabum*.

Conclusion

Flavonoid fraction of *Cardiospermum halicacabum* after induction of diabetes, normalized glucose level and lipid profile. It can be concluded that hyperlipidemic profile of STZ-induced diabetic rats can be improved by treatment with flavonoid fraction of *C. halicacabum*.

References

1. Betteridge, D.J. 1994. Diabetic dyslipidemia. *Am. J. Med*. (*Suppl. 6A*) 96: 25S-31S.
2. Harbilas, D., Brault, A. and Vallerandl, D. 2012. "*Populus balsamifera* L. (Salicaceae) mitigates the development of obesity and improves insulin sensitivity in a diet-induced obese mouse model. *J. Ethnopharmacol*. 141(3): 1012-1020.
3. Modak, M., Dixit, P., Londhe, J., Ghaskadbi, S., Paul, A. and Devasagayam, T. 2007. Indian herbs and herbal drugs for the treatment of diabetes. *J. Clin. Biochem. Nutr.* 40: 163-173.
4. Orchard, T.J. 1990. Dyslipoproteinemia and diabetes. *Endocrinol. Metab. Clin. North Am*. 19**:** 361-379.
5. Scoppola, A., Montecchi, F.R., Mezinger, G. and Lala, A. 2001. Urinary mevalonate excretion rate in type 2 diabetes: Role of metabolic control. *Atheroscler.* 156: 357-361.
6. Valiathan, M.S. 1998. Healing plants. *Curr. Sci.* 75: 112-126.
7. Venkatesh Babu, K.C. and Krishnakumari, S. 2005. Anti-inflammatory and antioxidant compound, rutin in *Cardiospermum halicacabum* leaves. *Ancient Sci. Life.* 25(2): 47-49.