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In Vitro Antidiabetic Activity of Cardiospermum Halicacabum leaves Extracts

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Abstract

The present study was designed to investigate the glucose uptake of (antidiabetic activity) crude n-hexane,ethanol, methanol and aqueous leaf extracts of Cardiospermum Halicacabum.Methods: of Cardiospermum Halicacabumleaf extracts were subjected to inhibitory effect of glucose utilization using specific standard in vitro procedure.Results: results in four different leaf extracts revealed that, the methanol extract at a concentration of 50g plant extract/l was found to be more potent than other extracts with the lowest mean glucose concentration of 201±1.69 mg/dl at the end of 27 hrs.Conclusions: The present findings suggest that, the methanolic extract showed a significant inhibitory effect on glucose diffusion in vitro thus validating the traditional claim of the plant.

Index terms— cardiospermum halicacabum, antidiabetic activity, glucose diffusion method.

1 Introduction

The plant Cardiospermum halicacabum Linn.

(Sapindaceae) is an annual or sometimes perennialclimber, commonly found as a weed throu-ghoutIndia. The tender, young shoots are used as avegetable, fodder, diuretic, stomachic, andrubefacient [5,6] . It is used in rheumatism, lumbago,nervous diseases, and as a demulcent in orchitis andin dropsy. In Sri Lanka, it is used for the treatmentof skeletal fractures. The juice of the herb is used tocure ear-ache and to reduce hardened tumours [7] . Itexhibits significant analgesic, anti-inflammatoryand vaso-depressant activity, which is transient in nature. In Authors ? ? ?: Department of Pharmacology, Rao's college of pharmacy, Nellore. e-mail: stalinmpcol@gmail.com vitro studies have revealed itsantispasmodic and curative actions confirming theuse of the herb in Ayurvedicmedicine [8] . The leaves of this plant mixed with castor oilare administered internally to treat rheumatism andto check lumbago [9] .The present investigation is directed to the exploration of the antidiabetic activity based on the study of the various extracts of Cardiospermum halicacabumwhich show inhibitory effect of glucose utilization and, are in use as hypoglycemic agent in traditional system of medicine.

2 II.

3 Materials and Methods

4 a) Plant material

The fresh plants ofCardiospermum halicacabum were collected from Nellore (AndhraPradesh) and authenticated by Dr.P.Jayaraman, Ph.D., Director, Plant Anatomy Research Centre, Medicinal Plants Research Unit, Tambaram, Chennai-45. A portion of the sample was kept in the department museum for further reference (PARC/2010/579).

5 b) Preparation of extracts

The shade dried powdered form of leaves of Cardiospermum halicacabumwas taken and subjected to successive extraction using n-hexane, Ethanol, and methanol by continuous percolation process in soxhlet apparatus. The aqueous extract was prepared by the maceration with double distilled water. Each extract was concentrated by distilling off the solvent and evaporated to dryness. The extracts were dissolved in 1% carboxy methyl cellulose (CMC) and used for the present study.

6 c) Effects of Various Extracts on In vitro Inhibitory

Glucose Diffusion A simple model system was used to evaluate the effects of Cardiospermum halicacabum leaf extracts on glucose movement in vitro. The model was adapted from a method described by Edwards et al. [10] which involved the use of a sealed dialysis tube into which 15ml of a solution of glucose and sodium chloride (0.15M) was introduced and the appearance of glucose in the external solution was measured. The model used in the present experiment consisted of a dialysis tube (6cmX15mm) into which 1ml of 50g/litre plant extract in 1% CMC and 1ml of 0.15M sodium chloride containing 0.22M D-glucose was added. The dialysis tube was sealed at each end placed in a 50ml centrifuge tube containing 45ml of 0.15M sodium chloride. The tubes were placed on an orbital shaker and kept at room B

iabetes mellitus is a metabolic disorder characterized by a loss of glucose homeostasis with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both [1]. According to WHO, it is estimated that 3% of the world's population have diabetes and the prevalence is expected to double by the year 2025 to 6.3% [2]. Management of diabetes without any side effect is still a challenge to the medical community. The use of the drugs is restricted by their pharmacokinetic properties, secondary failure rates and accompanying side effects [3]. Thus searching for a new class of compounds is essential to overcome diabetic problems. There is continuous search for alternative drugs [4]. D temperature. The movement of glucose into the external solution was monitored at set time intervals.

7 d) Statistical Analysis

Data are expressed as mean ± S.E.M. Statistical comparisons between groups were done by one way analysis of variance (ANOVA) followed by Tukey Kramer multiple comparison tests to analyze the differences. $p<0.001$ were considered as significant.

8 III.

9 Results

10 a) Effect on Glucose Diffusion

With the distinctive traditional medical opinions and natural medicines mainly originated in herbs, traditional medicine offers good clinical opportunities and shows a bright future in the therapy of diabetes mellitus and its complications. The effect of Cardiospermum halicacabumleaves as anti-diabetic agents has been studied. All extracts showed varying effect on glucose utilization. These extracts caused a significant decrease in glucose concentration during the experiment.

The effects of Cardiospermum halicacabumleaves extracts on glucose diffusion inhibition were summarized in Table **??**1. At the end of 27 hrs, glucose movement of control (without plant extract) in the external solution had reached a plateau with a mean glucose concentration above 300mg/dl (314±2.89). It was evident from the table that the methanol and aqueous extracts were found to be potent inhibitors of glucose diffusion ($p<0.001$) compared to control. The methanol extract was found to be more potent than other extracts showing the lowest mean glucose concentration of 201±1.69 mg/dl at the end of 27 hrs (Table .1) IV.

11 Discussion

Diabetes mellitus is a debilitating and often life threatening disorder with increasing incidence throughout the world. There is a steady rise in the rate of incidence of Diabetes mellitus and estimated that 1 in 5 may be diabetic by 2025 [11] . Antihyperglycemic activities of most effective plants were in part explained by the ability of the phytoconstituents to increase glucose transport and metabolism in muscle and/or to stimulate insulin secretion [12] . In the present study, research has been carried out to evaluate the potential of various extracts to additionally retard the diffusion and movement of glucose in the intestinal tract [13] .

A decoction of Cardiospermum halicacabumleaves is used worldwide for the treatment of various ailments including antidiabetic. The numerous polyphenolic compounds, triterpenoids and other chemical compounds present in the plant may account for the observed antidiabetic effects of the leaf extracts.

A Decoction of Cardiospermum halicacabumleaves was screened for hypoglycaemic activity on alloxan-induced diabetic rats. In both acute and sub-acute tests, the water extract, at an oral dose of 250 mg/kg, showed statistically significant hypoglycaemic activity [14] . The treatment with Cardiospermum halicacabumaqueous leaf extract (0.01-0.625 mg/mL) showed significant inhibition on LDL glycation in a dose-dependent manner. Tannins, flavonoids, apigenin, pinitol and luteolin, and other chemical compounds present in the plant are

speculated to account for the observed hypoglycaemic and hypotensive effects of the leaf extract. Values are expressed as mean ± SEM of triplicate; Data were analysed using one way ANOVA followed by Tukey-Kramer multiple comparison test; ***P<0.001 compared to control.

V.

12 Conclusion

The present study demonstrates the ability of various extracts of Cardiospermum halicacabumto inhibit glucose diffusion using an in vitro model of glucose absorption. In particular, methanol and aqueous extracts represent potential inhibitory of glucose diffusion supplements that may be useful for allowing flexibility in meal planning in type II diabetes. Further studies are required to elucidate whether in vitro effects represent therapeutic potential by limiting postprandial glucose absorptions and for improving glycemic control in type 2 diabetic subjects. [1] [2]

1

	tube over 27hr incubation period				
Extract	1h	3h	5h	24h	27h
Control(in the absence of extract)					

Figure 1: Table 1 :

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