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Screening of Anti-Diabetic Activity of Coscinium *Fensestratum colebr bark* in Alloxan Induced Wistar Albino Diabetic Rats

KEYWORDS: Alloxan, *Coscinium fensestratum colebr*, Glucose, Hyperglycemia, Serum.

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ABSTRACT *This study was conducted to evaluate the anti-diabetic activity of Coscinium fensestratum colebr bark in Alloxan induced diabetic rats. 18 Wistar strain of Albino rats weighed with 200-250grams were selected for the study. The rats were divided in to three groups. G-I served as Control, G-II is standard (Glibenclamide 10 mg/kg) and G-III is test (aqueous extract of Coscinium fensestratum colebr bark 500 mg/kg). This study was ethically cleared from institutional animal ethics committee. All the rats were treated with their respective drugs. Blood samples were collected at different time levels 0, 4th, 6th and 8th hour. Serum was separated and used for glucose estimation. The data was analyzed by SPSS (16.0) version. Rats treated with Alloxan showed significant increase levels of glucose at all the time periods compared to standard and test drugs. Plant extract given rats showed significant decrease in glucose levels compared to control group. Aqueous extract of Coscinium fensestratum colebr bark showed significant hypoglycemic effect in Alloxan induced diabetic rats.*

Introduction

Diabetes Mellitus (DM) is important and very prevalent disease affecting the population of both developed and developing countries. Recent studies showed 25% world population is affected with DM. This can be developed by decreased insulin secretion or decreased sensitivity of cells to insulin[1]. Based on this DM classified by Type-I (Insulin Dependent DM) and Type-II (Non Insulin Dependent DM)[2]. Type-I DM treated with insulin. Use of synthetic drugs has several limitations. The herbal drugs with anti-diabetic activity are yet to be screened for their effect. Medicinal plants are used for treatment of DM in developing countries because of their cost effective and less burden to the population[3]. Alloxan is a most frequently used drug to induce the DM in experimental animals. This drug causes severe necrosis of beta-cells of pancreases leads to decrease in insulin secretion leads to hyperglycemia[4]. According to the Ayurveda *Coscinium fensestratum colebr* has antidiabetic, anti-hypertensive, liver protection, anti-inflammatory and anti-oxidant activity[5, 6, 7]. From the review of literature the present study was conducted to screen anti-diabetic effect of aqueous extract of *Coscinium fensestratum colebr* bark in Alloxan induced diabetic rats.

Materials and Methods

Wistar strain of Albino rats weighing 200-250grams were used for the study. The animals were obtained from Central Institutional Animal House, Government Madurai Medical College. Madurai, Tamil Nadu. The study was conducted according to the GCP and CPCSEA guide lines. All the animals were fed with pellet diet and free accesses to water[8]. This study was ethically approved by Institutional Animal Ethics Committee.

Preparation of aqueous extract of *Coscinium fensestratum colebr* bark powder

Plant bark was collected from local areas of Madurai, Tamil Nadu. Bark was cleaned and made into fine powder by using domestic grinder. The powder was used for aqueous extraction. Required amount of plant powder was soaked in water in round bottomed flask for 24hours with intermittent shaking. After 24 hours the solute was filtered. The filtrate was evaporated to dryness and the final dark brown colored extract was obtained. The extract was stored and used for the study[9].

Induction of DM

Alloxan was obtained from LOBA Chemicals Pvt, Madurai, Tamil Nadu. DM was induced by the administration of Alloxan (110 mg/kg/i.p) as a single dose. After 18hr of fasting rats showed high glucose level were selected and divided into three groups of 6 of each group[10].

Study groups

Group-I: Gum acacia (1% 10ml/kg)

Group-II: Glibenclamide (10 mg/kg)

Group-III: Aqueous extract of *C.F* bark (500 mg/kg)

Experimental procedure

The group-I received Gum acacia (1 % 10ml/kg), group-II received standard drug and group-III given test drug. After administration of drugs to their selective groups blood samples were collected at 4 different (0, 4th, 6th and 8th hours) time periods. Collected blood was centrifuged and serum was separated. The collected serum was used for the estimation of glucose by standard method by using

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fully automated analyzer[11].

Statistical analysis

The data was analyzed by Statistical Analysis of Social Sciences (SPSS 16.0 version). One way ANOVA (Posthoc) followed by Dunnet t test used for find the statistical significant between the groups. p values less than 0.05 ($p<0.05$) considered statistically significant. Glucose levels were expressed in MEAN±SEM.

Results

Mean glucose values of group-I, II and III compared at 0 hour showed no significant difference. At 4th, 6th and 8th hour group-I showed significant levels of glucose compared to group-II and III. It was statistically significant (Graph-1). Standard drug significantly reduced the glucose levels at all the time periods compared to test group ($p<0.05$). Within the group rats received standard drugs showed time dependent significant reduction in glucose levels compared to control and test groups (Table-1).

Discussion

In the light of results, our study indicates that aqueous *Coscinium fenestratum colebr* bark extract have anti-diabetic activity in Alloxan induced diabetic rats. Alloxan is beta-cell cytotoxic agent induces the chemical diabetes and it is most commonly used agent to induce the Type-I DM in rats. Destruction of beta-cells leads to decrease the release of insulin, which cause for the development of hyperglycemia[12]. In this study administration of aqueous extract of *Coscinium fenestratum colebr* bark decreases the glucose levels at all the time levels that may be due to increase in the activity of enzymes involved in the glucose metabolism by insulin dependent pathway. This plant extract has various phytochemicals. These phytochemicals can act as anti-oxidant and reduce the Alloxan induced oxidative stress and prevent the damage to the beta cells. Due to this hypoglycemic effect plant extract can be used as an adjuvant in the treatment of DM.

Conclusion

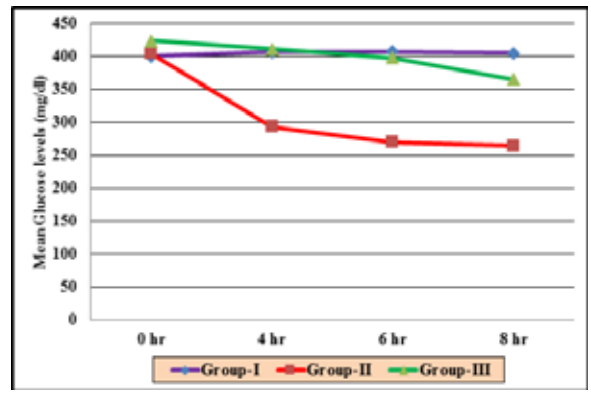
In the conclusion administration of *Coscinium fenestratum colebr* bark showed significant hypoglycemic effect. Further studies required to identify the causative molecule having hypoglycemic effect in the extract.

Table-1: Comparison of anti-diabetic effect of aqueous extract extract of *C.F* bark in Alloxan induced diabetic rats

Time (Hours)	Group-I	Group-II	Group-III
0 hour	400.23±6.32	404.56±7.45	424.12±09.85
4th hour	406.67±6.12	293.12±6.34*	411.67±10.50*
6th hour	407.23±5.67	270.13±5.67*,#	398.34±08.00*,#
8th hour	405.12±6.34	264.78±4.12*,#,$	365.23±10.82*,#,$

(*p<0.05 significant compared 0 hr with other time periods, #p<0.05 significant compared 4th hour with other time periods, $p<0.05 significant compared 6th hour with other time periods)

Graph-1: Comparison of mean glucose levels at different time interval between the groups



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