ANTIDIABETIC ACTIVITY OF KACHNAR (BAUHINIA VARIEGATA) LEAVES ON THE STREPTOZOTOCIN INDUCED WISTAR ALBINO RATS

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ABSTRACT

The Bauhinia Variegata is also known as Bauhinia Decora under the family of Fabaceae. It is also known as “Kachnar” in English and “Ashmantaka” in Sanskrit. It is a tree, distributed throughout an altitude of 1,300 m in the Himalayas. It is a small to medium sized tree growing 10–12 metres (33–39 ft) tall, deciduous in the dry season. A freshly collected bark of the plant is greyish brown externally and cream colored internally. The leaves are 10–20 centimetres (3.9–7.9 in) obcordate shaped, long and broad, rounded, and bilobed at the base and apex. The leaves of tree shed in month of November and December and new leaves grow in March-April. Literature survey revealed that the leaf of Bauhinia variegata is traditionally used as an astringent in diabetes. The present study was under taken to evaluate the antidiabetic activity of ethanol extract of leaf of Bauhinia variegata extract was evaluated using wister albino rat i.e. streptozotocin induced diabetes in wister albino rat by glucometer method, with 200 mg/kg, 400mg/kg and 600mg/kg.

KEYWORD: Bauhinia Variegata, Ethanolic Extract, Antidiabetic, streptozotocin, Albino Wistar Rat.

INTRODUCTION

Diabetes mellitus is a most common endocrine disorder, affecting more than 300 million people worldwide. Diabetes mellitus is a debilitating and life threatening disease as long as mankind. It is characterized by derangements in carbohydrate, protein and fat metabolism.

Diabetes mellitus is a group of endocrine syndromes characterized by hyperglycemia; altered metabolism of lipids, proteins and carbohydrates, and an increased risk of complications from
vascular disease.\[1\] The disease is characterized by an absolute deficiency of insulin caused by massive β-cell lesions or necrosis. Loss of β-cell function may be due to invasion by viruses, the action of chemical toxin or usually through the actions of autoimmune antibodies directed against the β-cells.\[2\] The metabolic alterations observed are milder than those described for IDDM (for example, NIDDM patients typically are not ketosis) but the long term clinical consequences can be just as devastating (for example, vascular complications and subsequent infection can lead to amputation of the lower limbs).\[3\] The mountain ebony, Bauhinia variegata belongs to the family Fabaceae. It is commonly known as Kachnar in Hindi. Transverse section of the leaf petiole shows single layered epidermis covered with thin cuticle. Covering trichomes showed uni to multicellular broad at the base and pointed at the apex & thin walled multicellular ballon shaped glandular trichomes.\[4\] Many remedial plants have been explored and their therapeutic efficacy has been widely exploited in complex disorders such as diabetes.\[5\] The leaf is, tonic, astringent and antidiuretic. It is useful in scrofula diseases. It is also used for ulcers and leprosy. The juice of bark is used in the treatment of Ethanolic extract.\[6\]

The crude extract from Bauhinia variegata have been shown to posses biological activities viz., Antistress/Adaptogenic Activity\[7\], Antihyper-lipidemic activity\[8\], antibacterial, antioxidant\[9\], immunomodulatory activities\[10\], Hepatoprotective activity\[11\], hypoglycemic activity\[12\]. Thus, The major objective of this study was to active constituent from the plant and to assess the anti-diabetic potential of Bauhinia variegata in vivo.\[13\]

**MATERIAL AND METHOD**

Chemicals Streptozocin of CDH, New Delhi was used for the inducted of diabetes and was obtained from Department of Pharmacy and the standard drug i.e. Gliclazide was received by KIMIA BIOSCIENCE LIMITED (HARYANA).

**Plant material**

Fresh and young green leaves of Bauhinia Variegata were collected from the Patanjali Research Institute Haridwar & and got identified by Dr. Sunita garg emeritus Scientist, CSIR-National institute of science communication and information resources. Authentication no. NISCAIR/RHMD/Consult/2019/3457-58).
Preparation of plant extract
Extraction of plant
The freshly collected Leaf Bauhinia Variegata were shaded dried until cracking sound was observed during breakage, and then these are made in to coarsely powdered by using dry grinder. The powdered Leaf of the plant (750 gm.) was packed in soxhlet apparatus and continuously extracted with ethanol till complete extraction, after completion of extraction. The solvent was removed by distillation and then concentrated extract obtained was dried under reduced pressure using 2538 variegata evaporator at temperature not exceeding 40º C and then give moderate heating on water bath. A green extract approximate 600 gm.\cite{14}

ANTI-DIABETIC STUDIES
Experimental Animals
The adult male albino rats of weight 180-240 gm were selected for the study. All animals were procured from disease free animal house, translam institute of pharmaceutical education & research The animals were fasted overnight with water ad labium. The starting dose of 250 mg/kg of ethanolic extract was administered orally to three animals in each group. If mortality was observed in two or three animals, then the dose administered was assigned as a toxic dose. If mortality was observed in one animal, then the same dose was repeated again in three animals to confirm the toxic dose. If mortality was not observed, the procedure was repeated for further higher doses such as 500mg/kg body weight. Animals were observed individually after dosing at least once during the first 30 minutes, periodically during the first 24 hours, with special attention given during the first 4 hours, and daily thereafter, for a total of 14 days, expect where they need to be removed from the study and humanely killed for animal welfare reasons or were found dead.\cite{15}

Preparation of Dose
The Dose of 200 mg/kg and 400 mg/kg of ethanol extract was selected for the test. All the doses was given orally after making emulsion in vehicle i.e. 1% acacia gum and the standard drug i.e. gliclazide was given orally (10 mg/kg) in the vehicle.

The Antihyperglycemic Effect of Ethanolic Extract of Leaves of Bauhinia Variegata on Streptozocin Induced Diabetic Rats
A) Induction of experimental diabetes: Diabetes mellitus was induced by administering intraparitoneal injection of streptozotocin 120 mg/kg. to the overnight fasted rats. Fasting blood glucose was determined after depriving food for 16 hrs with free access of drinking
water. Hyperglycemia was induced by a single i.p injection of 120 mg/kg of streptozotocin in sterile saline after 2 days of streptozotocin, the hyperglycemia rats (glucose level >250 mg/dl) were separated and divided into different groups comprising of 4 rat each for the anti-diabetic study. The treatment (P.O) was started from the same except normal control and diabetic control group for a period of 21 days. During this period, animal in all group had free access to standard diet and water. Body weight and blood glucose level were estimated on 7th, 14th and 21th day of the treatment.

B) Sample collection
Blood sample were collected from tail nipping and glucose level was determined by an automatic electronic glucometer (Accuchek comfort).

C) Procedure: After checking the fasting blood glucose in overnight fasted diabetic rats; they were divided into five groups of five rats reach and one group of non-diabetic rats.

All the doses were given in the following manner
- **Group A** served as normal control and did not receive any treatment.
- **Group B** served as diabetic control and received streptozotocin and vehicle (0.2 ml of 2% aqueous gum acacia)
- **Group C** gliclazide (10 mg / kg p.o) and served as standard.
- **Group D** Ethanolic extract (200 mg / kg p.o)
- **Group E** Ethanolic extract (400 mg / kg p.o)
- **Group F** Ethanolic extract (600 mg / kg p.o)

The treatment was continued for 3 hour. During this period, food and water was supplied ad libitum. All the doses were administered orally by the oral feeding needle. The effect of extract on blood glucose levels was estimated on overnight fasted rats on hour 0, 1, 2, and 3 by the method described before. The basal values are The treatment was continued for 3 hour. During this period, food and water was supplied ad libitum. All the doses were administered orally by the oral feeding needle. The effect of extract on blood glucose levels was estimated on overnight fasted rats on hour 0, 1, 2, and 3 by the method described before. The basal values are those of the day on which extract was started to give. The general behaviors of the animals were recorded daily. The blood glucose level in (Mean ± S.E.M.) is shown in the Table 1 and Table 2.
Table 1: The Antihyperglycemic Effect of Ethanolic Extract of Leaves of Bauhinia Variegata on Streptozotocin Induced Diabetic Rats.

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Fasting blood glucose level (mg/dl)</th>
<th>0th day</th>
<th>7th day</th>
<th>14th day</th>
<th>21th day</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Normal Control</td>
<td></td>
<td>84.06±2.64</td>
<td>82.25±2.58</td>
<td>80.32±3.13</td>
<td>82.37±2.41</td>
</tr>
<tr>
<td>B</td>
<td>Diabetic Control</td>
<td></td>
<td>235.23±4.51*</td>
<td>277.12±6.53*</td>
<td>315.00±5.18</td>
<td>379.00±6.48**</td>
</tr>
<tr>
<td>C</td>
<td>Gliclazide Std. (10mg/kg)</td>
<td></td>
<td>330.01±4.22</td>
<td>259.74±5.06*</td>
<td>195.36±4.88**</td>
<td>115.23±4.12**</td>
</tr>
<tr>
<td>D</td>
<td>Ethanol Extract (200mg/kg)</td>
<td></td>
<td>350.21±5.48</td>
<td>329.21±4.59*</td>
<td>308.42±5.07*</td>
<td>218.62±3.11**</td>
</tr>
<tr>
<td>E</td>
<td>Ethanol Extract (400mg/kg)</td>
<td></td>
<td>305.0±5.23</td>
<td>289.00±4.54*</td>
<td>263.01±4.97*</td>
<td>183.12±4.17**</td>
</tr>
<tr>
<td>F</td>
<td>Ethanol Extract (600mg/kg)</td>
<td></td>
<td>307.48±5.32</td>
<td>252.61±5.07</td>
<td>210.36±3.52</td>
<td>175.83±3.31</td>
</tr>
</tbody>
</table>

Value are mean + SEM, n=6, *P < .05, **P < 0.01 and ***P < 0.05 vs diabetic control

RESULT AND DISCUSSION

Ethanolic extract of bauhinia variegata leaves was subjected to antidiabetic activity in rats where Streptozotocin (120 mg/kg, b.w, i.p) used as the diabetogenic agent .A marked rise in fasting blood glucose level observed in diabetic control compare to normal control rates. Ethanolic extract of bauhinia variegate (at 250 and 500 mg/kg) exhibited a dose dependent significant anti-hyperglycemic activity on 7th, 14th, and 21th day part treatment. The extract
dose of 100 mg/kg also caused reduction in blood glucose level but the result was found statistically insignificant.

The antihyperglycemic effect of ethanol extract at was found less effective than the reference standard. Gliclazide produced a significant reduction in blood glucose compare to diabetic control. When the activity of extract was done by glucose tolerance test in glucose loaded rats ethanolic extract should significant effect on the blood glucose level but extract of 100mg/kg did not show the significant result. ethanolic extract 250mg/kg and 500mg/kg showed the significant decrease in blood glucose level.

REFERENCES


