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Anti Hyperglycemic Activity of Extracts of Leaves of *Bauhinia Racemosa Lamk* (*Family-Caesalpineaceae*) on Normal and Alloxan-Induced Diabetic Rats

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Subject: Pharmacology

Abstract

Alloxan induced hyperglycemic rats showed a significant decrease ($p<0.05$) in body weight on days 10, 15, 20 of the experiment. Daily oral Treatment with both extracts showed significant increase ($p<0.05$) in body weight at the end of the experiment as compared to diabetic control group. The present study shown the treatment of alloxan induced rats with both methanol and aqueous extracts of Bauhinia racemosa for 20 days could restore the normal biotransformation by shifting the balance of carbohydrate metabolism9.Improved pancreatic exocrine activities can be ascribed to insulin secretion from existing residual Beta-cells of islets or due to enhanced transport of blood glucose to peripheral

Keyword: *Bauhinia racemosa Lamk, diabetic rats, anti heprglycemic activity*

Introduction

Diabetes mellitus is characterized by Hyperglycemia with disturbances of carbohydrate, lipid and protein metabolism, obesity and lack of exercised play an important role in Diabetes[1].According to world health organization report, around 3.5 million deaths every year worldwide due to complications of diabetes such as retinopathy, diabetic coma, nephropathy, neuropathy, Diabetic Ketoacidosis etc. Despite advances in understanding of the disorder and the management of the mortality & morbidity due to the disease is increasing .The focus has been shifted to treat the various plant derived drugs due to their safety,efficacy,cultural acceptability with lesser side effects due to the presence of useful Phyto-constituents.

Increased Production of superoxides and lowered antioxidant defense mechanisms in hyperglycemia is associated the etiology and complications of Diabetes mellitus. Bauhinia racemosa lamk (Family-*Caesalpineaceae*) is commonly known as Bidi leaf tree. It is a shrub & tree available throughout the india.The various parts of plant has been reported to possess a number of therapeutical activities to manage diseases like hepato-protective, hypoglycemic effect, vermicidal urinary infections, Tuberculosis[3] etc.The leaves containing flavonoids, phenolic compounds, carbohydrates & no reducing carbohydrates. The plant synthesizes primary & secondary metabolites which have medicinal values[4].

Materials & Methods

Plant Material and Extract:

Fresh leaves of *Bauhinia racemosa* were collected at Mulugu, Warangal in Andhra Pradesh. Then the leaves were cleaned and shed-dried at room temperature about 25days.Then the dried leaves were crushed into powder by the help of mechanical grinder and the extract is collected by using Soxhlet apparatus. The extracts were collected by using solvent methanol.The aqueous extract collected by decoction method. The semisolid masses were concentrated by evaporating the solvent and covered (flask containing extract) by Aluminum foil and refrigerated.

ANIMALS:

Wistar albino rats (180-220gms) and Swiss albino mice (22-30gms) of either sex were procured from

the animal house of TPCP for 2 weeks to acclimatize in the pharmacology laboratory before starting the experiment. All the animals were fed with standard diet and water *ad libitum*.The animals were kept 12 hrs fasting before commencement of the experiment.

ACUTE TOXICITY TEST[5]:

The Acute oral Toxicity were Carried out as per the guidelines set by organization for economic and co-operation and development (OECD, 425), and the study was approved TPCP, IAEC. No **1505/PO/a/11/CPCSEA**, no death took place after the administration of 2000mg/kg body wt of both the extracts. Hence the author selected $1/10^{th}$ & $1/5^{th}$ as therapeutic dose i.e., 200mg and 400mg/kg to evaluate anti-diabetic activity.

ANTI-DIABETIC ACTIVITY:

The rats were divided in to seven groups and each group consists of six animals. Group-I served as normal provided with normal saline. Group-II served as diabetic control and received 0.5% CMC orally(10ml/kg) with alloxan, Group-III received methanolic extract (0.20gm/kg) with alloxan, Group –IV received methanol extract 0.40gm/kg with alloxan, group-V received aqueous extract 0.20gm/kg eighth alloxan, group-Vl received aqueous extract 0.40gm/kg with alloxan and group-VII served as positive control and received standard drug Pioglitazone(12mg/kg). The treatment was continued for 20 days by administering the respective fractuins suspended in 0.5% cmc. After 5days of treatment, blood samples were collected by puncturing the retro-orbital plexus under light ether anesthesia. Serum was separated by micro-centrefusing the samples at 3000npm for 15min and stored in the refrigerator until analyzed. The serum was analyzed for blood glucose level (GOP-POD method). The quantitative measurements were made on six animals in each group and the values of biochemical estimations are expressed as mean ± S E M. The dates obtained were subjected to ANOVA.

HYPOGLYCEMIC EFFECTS AND EFFECT ON BODY WEIGHT BY EXTRACTS OF *BAUHINIA RACEMOSA* IN NORMAL RATS:

Overnight tested rats were divided in to seven groups of six animals each. The first group served as a control group received distills water (5ml/kg), group-II received 0.5% cmc 10ml/kg group-III & lV received *Bauhinia racemosa* methanol extracts 200 & 400 mg/kg respectively. Group V & VI received Bauhinia racemosa aqueous extracts 200 and 400mg/kg respectively. Group Vll served as positive control and received standard drug Pioglitazone 12mg/kg.

The baseline fasting blood glucose was determined before oral administration of respective treatment. The result is shown in **Table-1 & Table-2, fig no.1**

Table-1 Effect of MEBR & AEBR on body weight in normal rats.

Treatment	Normal	MEBR 200	MEBR 400	AEBR 200	AEBR 400	Diabetic control	Pioglitazone
Basal Values	169.1±2.390	164.4±2.432	165.2±2.251	167.7±3.478	168.4±4.321	166.8±4.370	167.9±4.012
1^{st} day	183.7±3.150	165.3±2.319	167.3±3.523	166.3±4.238	167.2±3.872	165.7±5.115	169.8±2.817
5th day	186.5±1.672	167.3±1.998	172.1±2.898	167.1±2.112	170.7±2.788	160.5±3.877	172.9±2.120
10^{th} day	192.4±2.112	171.1±*4.236	176.4±*1.728	170.4±*4.116	172.4±*2.125	155.3±2.236[9]	177.4±*3.124
15^{th} day	195.7±2.066	174.2±*1.899	179.8±*1.898	173.7±*3.222	177.1±*1.899	191.1±3.124[9]	181.2±*3.544
20^{th} day	201.2±2.355	178.8±*2.129	181.3±*1.389	179.1±*1.988	182.1±*2.112	144.7±3.181[9]	185.0±*1.988

The extracts were administrated at two doses 200 & 400 mg/kg. Body weights were expressed as gms and each value is mean ± SEM of 6 observations $^{*}p < 0.05$ compared to normal and $^{*}p<0.05$ compared to diabetic control.

MEBR-Methanolic extract of Bauhinia racemosa

AEBR-Aqueous extract of Bauhinia racemosa

Figure no-1

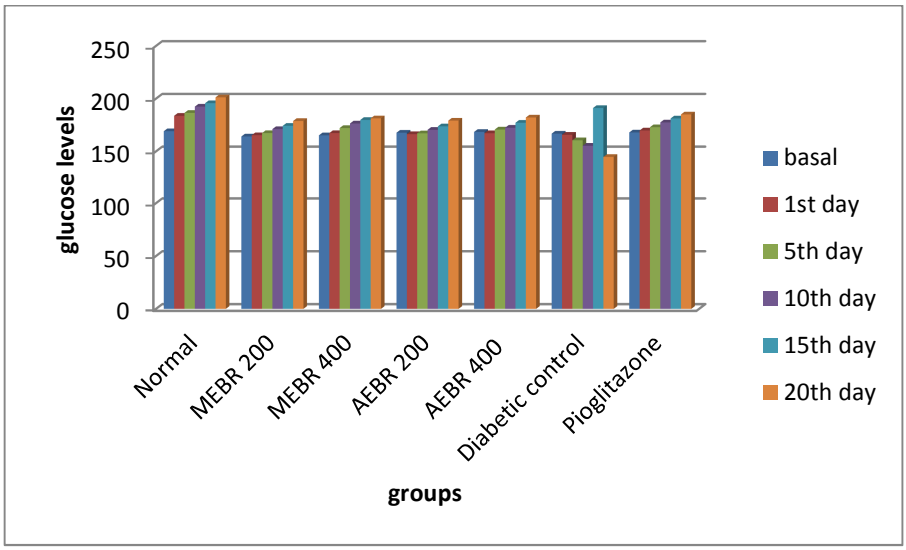


Table-2, Effect of different extracts of Bauhinia racemosa on blood glucose level in normal rats.

Treatment	Normal	0.5%cmc	MEBR 200	MEBR 400	AEBR 200	AEBR 400	Pioglitazone
Basal Values	87.12±0.621	86.89±0.598	86.87±1.866	85.87±0.787	85.89±0.767	86.47±o.821	87.28±1.151
1st day	84.67±0.898	86.68±1.812	85.21±1.940	81.24±0.867	84.72±0.682	84.78±1.112	81.89±1.602
5th day	83.78±0.279	85.98±0.812	81.18±0.972*	80.12±0.845*	82.62±0.581*	81.29±0.98*	76.13±1.212*
10th day	83.21±0.268	85.12±1.121	77.19±0.656*	75.21±1.232*	78.72±0.872*	76.32±0.782*	67.89±0.912*
15th day	84.32±0.429	84.89±0.982	76.49±1.118*	67.11±0.899*	72.11±0.712*	68.25±0.688*	58.22±0.88*
20th day	85.12±1.423	85.62±0.768	72.18±1.311*	58.28±0.62*1	71.89±0.818*	62.18±0.722*	51.82±0.428*

Methanol and Aqueous extracts of Bauhinia racemosa were administered in two doses 200 & 400mg/kg.Blood glucose values are as expressed as mg/dl and each value is mean ±SEM of 6 observations. $^{*}p<0.5$ compared to normal.

INDUCTION OF HYPERGLYCEMIA WITH ALLOXAN[9]:

The selected rats were, weighed and marked for individual identification and fasted for 16 hrs.The rats were injected with alloxan monohydrate dissolved in sterile saline (0.9% Nacl) at a single dose of 150mg/kg intraperitonially.The baseline fasting blood glucose was determined before intraperitonial administration of alloxan. After 6hr alloxan administration 5% glucose solution was infused orally in feeding bottle for a day to overcome the early hypoglycemic phase. All the rats became consistently hyperglycemic and stable by 5th day post-induction. Rats showing fasting blood glucose level more than 300mg/dl were selected for the study.

EXPERIMENTAL PROTOCAL[10]:

The animals were divided into seven groups of six animals each. Group-I served as normal control treated with distilled water 5ml/kg, group-II served as vehicle control treated with0.5% CMC 10ml/kg, Group III & IV rats treated with MEBR 200 & 400 mg/kg, Group V & VI rats treated with AEBR 200 & 400mg/kg respectively. Group-VII rats treated with Pioglitazone 12mg/kg. The daily oral treatment was administrated for 20 days.

BLOOD SUGAR ANALYSIS[11]:

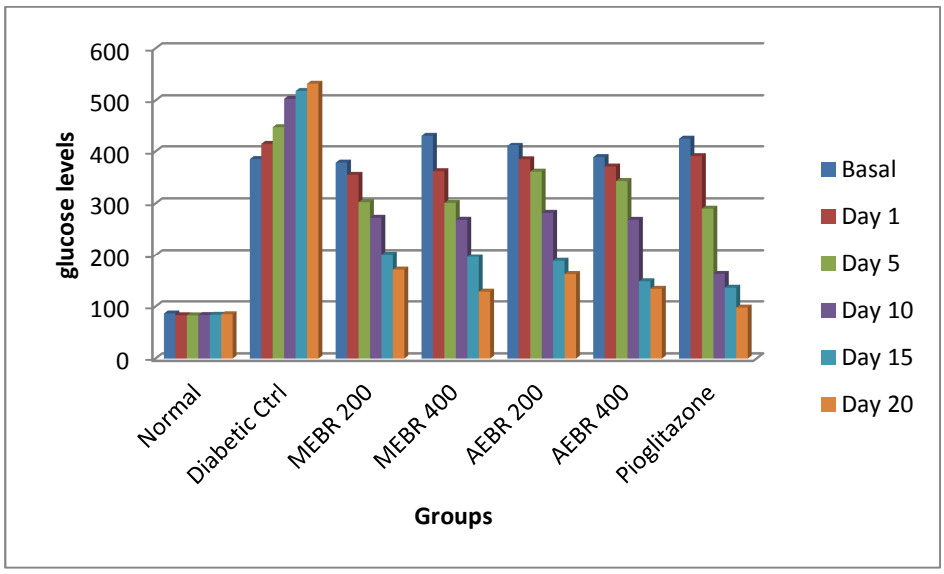
Blood was withdrawn retro-orbitally with the help of capillary tube under light ether anaesthesia.Blood samples were collected and allowed to clot foe 10 minutes. Serum was separated by centrifuging at 3000 rpm for 10 minutes and stirred up to analysis. Glucose estimation and body weight was done in all the groups prior to treatment and 1hr after the respective treatment on first, fifth, Tenth, Fifteenth and Twentieth day of the experiment. Blood Glucose was determined by tinder's glucose oxidase method[12]. The animals were sacrificed (if necessary) after collection of blood on 20th day. The results were shown in **Table-3 & fig no 2**

Table-3, Effect of methanolic and aqueous extracts of Bauhinia racemosa on blood glucose level in Diabetic rats.

Treatment	Normal	Diabetic control	MEBR 200	MEBR 400	AEBR 200	AEBR 400	Pioglitazone
Basal values	86.68±0.695	385.48±1.013	378.62±1.226	432.11±1.115	412.72±0.998	389.22±0996	426.62±1.311
1st day	83.23±0.426	416.62±*1.012	355.12±*1.001	362.28±*0.892	385.11±*0882	371.18±*0860	391.12±*0.926
5th day	83.12±0.263	448.68±*0.926	302.68±*0.889	301.18±*0.768	361.28±*0.772	343.26±*0.717	290.11±*0.722
10th day	83.67±0263	503.18±*0.278	272.62±*0.674	268.78±*0.448	282.18±*0.482	268.72±*0.381	162.72±*0.622
15th day	84.2±0.338	518.36±*1.118	201.21±*0.449	196.34±*0.678	188.21±*0.645	148.61±*0.657	136.23±*0.588
20th day	85.21±0.468	532.21±*1.002	171.18±*0.536	128.67±*0.323	162.63±*0.544	134.11±*0.432	98.11±**0.432

Methanolic and aqueous extracts of Bauhinia racemosa administered at two doses 200 & 400mg/kg.Blood sugar level expresses as $^{**}P<0.01$ mg/dl and each value is mean±SEM of 6 observations, $^{*}p<0.05$ compared with their basal values of respective groups.

Figure no-2



STATISTICAL ANALYSIS:

The results were expressed as the mean ± S E M. The results obtained from the present study were analyzed using one-way ANOVA followed by Dennett's multiple comparison tests.

RESULTS & DISCUSSION:

Alloxan induced hyperglycemic rats showed a significant decrease ($p<0.05$) in body weight on days 10, 15, 20 of the experiment. Daily oral Treatment with both extracts showed significant increase ($p<0.05$) in body weight at the end of the experiment as compared to diabetic control group.

The present study shown the treatment of alloxan induced rats with both methanol and aqueous extracts of *Bauhinia racemosa* for 20 days could restore the normal biotransformation by shifting the balance of carbohydrate metabolism[9].Improved pancreatic exocrine activities can be ascribed to insulin secretion from existing residual Beta-cells of islets or due to enhanced transport of blood glucose to peripheral.

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