**Anti-diabetic properties of *Stevia rebaudiana* leaf extract**

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**ABSTRACT**

To evaluate the anti-inflammatory activity of *S. rebaudiana* leaf extract on experimentally induced acute inflammation in wistar rats. *S. rebaudiana* widely used in Brazil to treat inflammation as a folk medicinal plant. The *in-vivo* anti-inflammatory activity was studied using acute (carrageenan paw edema), models of inflammation at dept. of pharmacology VSS medical College Burla. The test drug possesses anti-inflammatory activity in acute inflammatory model which can be attributed to their anti-oxidant properties.

**INTRODUCTION**

Diabetes mellitus is a chronic metabolic disorder characterized by high glucose concentration (hyperglycemia) due to insulin deficiency and/or insulin resistance. It is a metabolic disorder in which there is an inability to oxidize carbohydrate due to disturbances in insulin function[1]. Diabetes is one of the oldest known diseases of the man whose devastating effect is increasing by the day and severity almost at epidemic level. The number of people suffering from the disease worldwide is increasing at an alarming rate with a projected 366 million peoples likely to be diabetic by the year 2030 as against 191 million estimated in 2000 (wild et al, 2004)[2]. Developing countries are the not affected because of expansive and inadequate treatments. (djr olo etd, 1998), coupled with the side effect associated with these drug. Thus the search of a new drug with low cost, more potential and without adverse effect becomes inevitable. A great number of medicinal plants have been used in the treatment of diabetes in different part of the world. Evaluation of the antidiabetic potentials of these plants becomes necessary to provide scientific proof and justify their uses in ethnomedicine. *Stevia rebaudiana* belongs to the Aster family which is indigenous to the northern region of South America. It grows in many part of Brazil, Paraguay, central America, Thiland and Chine[3]. It is mainly used as natural sweetners. Besides this it is also used for different medicinal purposes around the globe. The present study was designed to test the antihyperglycemic effect of ethanolic extract of *S. rebaudiana* leaves in alloxan-induced diabetes.

**MATERIAL AND METHOD**

**Collection and leaf extract preparation**

The fresh leaves of *S. rebaudiana* collected from young plant by indo High tech Agro organization, Ludhiana. The leaf was identified and authenticated there by their experts. The leaves were grinded there and packets of the powered were supplied to the department of pharmacology, VSS medical college Burla, Sambalpur for the present study[4]. All chemicals and drugs were obtained commercially and were of analytical grade. All required apparatus were at PG Dept of Pharmacology, V.S.S Medical College, Burla. For antidiabetic activity photocolorimeter was used to monitoring the blood glucose level with crest kit box. (GOP- POD Method).

**Phytochemical Screening**

The ethanolic extract of the leaves obtained was subjected to preliminary phytochemical screening to identify the chemical constituents. The methods of analysis employed were those described by Trease and Evans (1989)[5].

**Animals and Induction of diabetes mellitus**

Healthy abino rabbits of either Sex, inbred in the departmental animal house, weighing between 2 to 2.5 kg, aged between 6 months to 1 year were used for this study. Alloxan diabetes can be produced by intravenous, intramuscular, subcutaneous, oral administration of different doses. In the present study alloxan 80mg/kg by intravenous route has been sued as the route is least toxic.

**Experimental Design**

Method used by Mohan et al (1978) was followed to study the effect of SRLE on the fasting plasma glucose at different hour’s intervals in alloxan diabetic rabbits.

**Table No – I**

<table>
<thead>
<tr>
<th>Drug / Vehicle</th>
<th>Dose per kg body weight</th>
<th>Route of Administration</th>
<th>Nature of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% Tween 80</td>
<td>2ml</td>
<td>Oral</td>
<td>Vehicle for SRLE</td>
</tr>
<tr>
<td>Glibenclamide</td>
<td>0.5mg</td>
<td>Oral</td>
<td>Standard antihyperglycemic drug.</td>
</tr>
<tr>
<td>SRLE</td>
<td>100, 200 and 400 mg</td>
<td>Oral</td>
<td>Indigenous test drug</td>
</tr>
<tr>
<td>Alloxan</td>
<td>80 mg</td>
<td>I.V</td>
<td>Diabetes inducing agent</td>
</tr>
</tbody>
</table>

The diabetic rabbits with FPG level 200-250 mg/dl were divided into different groups of 6 animals each in the following manner.
RESULT AND DISCUSSION

Alloxan – induced hyperglycemia has been described as a useful experimental model to study the activity of antidiabetic agents. The following table shows the result of the effect of three doses (100,200,400 mg/kg) of the ethanolic extract of S. rebaudiana leaves[7].

CONCLUSION

The study indicates that the ethanolic extract of S. rebaudiana leaves passes anti-diabetic properties which suggest the presence of biologically active components[8]. The extract might be promoting glucose uptake and metabolism or inhibiting hepatic gluconeogenesis[9]. SR leaf extract administered in doses of 100, 200 and 400 mg/dl to three different group of diabetic rabbits whose FPG was estimated just before (0 hour) and 2, 4 as well as 8 hours after the drug administration. The result of this study depicted in (Table – II Graph –1) reveals that the drug exhibited significant effect on FPG of diabetic rabbits. Post ANOVA analysis of the data by) paired t-test reveals that SRLE with 100mg/kg dose reduced mean FPG levels in diabetic rabbits significantly at 8 hours; with 200 mg/kg at 4 and 8 hours; and with 400 mg at 2, 4 as well as at 8 hr intervals in comparison to its vehicle[10]. The peak effect with each dose was observed at 8 hour. With low dose the onset of antihyperglycemic action was delayed whereas with high dose an early response was observed.

REFERENCES


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Table No II: Effect of SRLE on Mean Fasting Plasma Glucose In Diabetic Rabbits (Acute Study)

<table>
<thead>
<tr>
<th>G p</th>
<th>Treatment</th>
<th>Dose</th>
<th>Mean Fasting Plasma Glucose SEM (mg/dl)</th>
<th>0 Hr</th>
<th>2 Hr</th>
<th>4 Hr</th>
<th>8 Hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Glibenclamide</td>
<td>0.5mg</td>
<td></td>
<td>230.7±3.3</td>
<td>227.8±3.12</td>
<td>163.5±4.03**</td>
<td>169.5±3.78**</td>
</tr>
<tr>
<td>II</td>
<td>5%Tween80</td>
<td>2ml</td>
<td></td>
<td>231.3±3.4</td>
<td>230.5±3.61</td>
<td>231.2±3.23</td>
<td>227.5±3.67</td>
</tr>
<tr>
<td>III</td>
<td>SRLE</td>
<td>100mg</td>
<td></td>
<td>231.3±3.3</td>
<td>225.8±3.60</td>
<td>231.5±4.19</td>
<td>203.5±3.92**</td>
</tr>
<tr>
<td>IV</td>
<td>SRLE</td>
<td>200mg</td>
<td></td>
<td>231.0±3.59</td>
<td>222.8±3.12</td>
<td>203.3±3.40**</td>
<td>191.3±3.14**</td>
</tr>
<tr>
<td>V</td>
<td>SRLE</td>
<td>400mg</td>
<td></td>
<td>234.8±2.78</td>
<td>221.8±3.64</td>
<td>199.5±6.68**</td>
<td>182.5±3.83**</td>
</tr>
</tbody>
</table>

Determination of blood glucose levels

Blood samples from the overnight fasted diabetic rabbits were collected. Then the drug and the vehicles in their indicated doses were administered orally to the respective groups. The effect of SRLE on FPG was compared to that of their respective vehicle and glibenclamide, the standard anti-hyperglycemia drug at different time interval by photocorimeter.

Statistical Analysis

Blood glucose levels were expressed in mg/dl as mean ± SEM. The data were statistically analyzed suing ANOVA with multiple comparisons versus control group. The values of P<0.01 were considered as significant[6].

Graph I

Effect of SRLE on FPG in diabetic Rabbits(Acute Study)