ANTI-DIABETIC ACTIVITY OF METHANOL EXTRACT OF
ROSENVINGEA INTRICATA (J.AG.) BOERGESEN-AN IMPORTANT
BROWN SEAWEED

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ABSTRACT

The present study was indented to screen the anti-diabetic activity of Rosenvingea intricata (J.Ag.) Boergesen, collected from Idinthakarai, Tirunelveli district, Tamil Nadu, India. The methanolic extract of Rosenvingea intricata (J.Ag.) Boergesen was given via intraperitoneal injection at a dose of 200 and 400mg/kg on alloxan induced Wistar albino rats. The fasting blood glucose level, body weight and the glucose level after the treatment of diabetic rats were measured. The animals treated with 200mg/kg methanolic extract were shown the best result of decrease in blood glucose level at a regular interval when the time increased up to 7h as compared to the dose of 400mg/kg methanolic extract treated animals. The result of the present study expressed that the anti-diabetic activity of the methanol extract was dose dependent.

KEYWORDS: Anti-diabetic, Rosenvingea intricata, Methanolic extract, Wistar albino rats.

1. INTRODUCTION

The increasing prevalence of diabetes represents an enormous socio-economic burden in the developing countries. The World Health Organization (WHO) has estimated that over 300 million people worldwide will have Diabetes mellitus by the year 2025 with alarming proportions from developing countries.[1] Diabetes mellitus is a persistent disease caused by inherited or acquired deficiency in insulin secretion and by decreased responsiveness of the pancreas to secrete insulin. There are two main types of diabetes. Type-1 diabetes is due primarily to autoimmune mediated damage of pancreatic islet β-cells, resulting in remarkable
insulin deficiency, while Type-2 diabetes is characterized by abnormal insulin secretion associated with varying degrees of insulin resistance.[2] In recent years, due to the adverse effects of synthetic hypoglycemic drugs, interests in alternate therapeutic approach have become very popular. Nowadays, herbal drugs are gaining attractiveness in the treatment of diabetes and its complications due to their efficiency, low incidence of side effects and low cost.[3] An increasing number of studies have demonstrated that marine macro algae or seaweeds are the richest source of compounds which have potential beneficial uses to mankind.[4,5] Among the marine macro algae, brown algae showed to be rich sources of biochemicals with potential anti-diabetic activities.[6] Fucoidans, polysaccharides containing substantial percentages of L-fucose and sulfate ester groups, are constituents of brown algae that have numerous other biological properties.[7] But till date, it is the first study about the anti-diabetic activity of Rosenvingea intricata. In the present study, the effect of the methanol extract of Rosenvingea intricata with a dose of 200 and 400mg/kg body weight was investigated by evaluating anti-diabetic property in alloxan induced diabetic rats.

2. MATERIALS AND METHODS

2.1. Collection of Plant Sample

Rosenvingea intricata (J.Ag.) Boergesen is brown seaweed belonging to Phaeophyceae member showed much consideration in the present study for anti-diabetic activity. Rosenvingea intricata (J.Ag.) Boergesen was collected from Idinthakarai, Tirunelveli district, Tamil Nadu, India. The collected plant samples were rinsed with marine water to remove debris and epiphytes. The entire epiphytes were removed using soft brush. The plants were brought to the laboratory. In the laboratory, the plants were once again washed in freshwater and stored in refrigerator for further analysis.[8]

2.2. Preparation of methanol extract

For the preparation of methanol extract of Rosenvingea intricata, the collected plant specimens were washed thoroughly and placed on blotting paper and spread out at room temperature in the shade condition for drying. The shade dried samples were grounded to fine powder using a tissue blender. The powdered samples were then stored in the refrigerator for further use. 30g powdered sample was packed in Soxhlet apparatus and extracted with methanol for 8h separately. The excess amount of methanol was evaporated and fine methanol crude powder was prepared and stored in the refrigerator for the Anti-diabetic activity.[9]
2.3. Experimental Animals

Wistar albino rats (160-200g) of either sex were procured from Venkateswara Enterprises, Bangalore, Karnataka, India. The selected animals were acclimatized for 7 days under standard husbandry conditions, i.e. room temperature 35±1°C, relative humidity 45-55% and light/dark cycle 12/12h. Animals were provided with standard rodent pellet diet and had free excess to water. The composition of diet is 10% protein, 4% Arachis oil, 1% fibers, 1% calcium, 1000 IU/gm vitamin A and 500 IU/gm vitamin D. All the animals were acclimatized to the laboratory conditions prior to experimentation. All the experiments were conduct between 10.00 and 17.00h and were in accordance with the ethical guidelines of the International Association for Study of Pain. All experiments were carried out according to the guidelines for care and use of experimental animals and approved by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA).

2.4. Acute toxicity test

Acute oral toxicity study was performed as per OECD-423 guidelines. Wistar albino rats (n=6) of either sex selected through random sampling technique was used for acute toxicity study. The animals were kept fasting for overnight providing only water, after which the extract (50% methanolic extract) was administered orally at the dose level of 5mg/kg body weight by gastric intubation and observed for 14 days. If mortality is observed in 2 out of 3 animals, then the dose administered would be assigned as toxic dose. If mortality is observed in 1 animal, then the same dose would be repeated again to confirm the toxic dose. If mortality is not observed, the procedure would be repeated for further higher doses such as 50, 300 and 2000mg/kg body weight. According to the results of acute toxicity test, the doses were chosen for experiments.

2.5. Induction of diabetes and experimental design

Prior to the beginning of the experiment all the animals were not allowed for food for 18 hours but water was allowed without stoppage. Wistar albino rats received alloxan (150mg/kg), freshly prepared in 0.1M cold citrate buffer (pH 4.5). Normal control rats received citrate buffer only. 48 hrs after alloxan administration, blood samples were collected from retro orbital plexus and plasma glucose was determined. The induction of Diabetes mellitus was confirmed by determination of plasma glucose level (≥250mg/dl). Diabetic rats were kept untreated for four weeks. At the end of 4th week, plasma glucose of diabetic rats ≥250mg/dl was selected for anti-diabetic studies.
2.6. Study design

Wistar albino rats were randomly grouped into 5 groups (6 rats/group) and received the following treatment for 4 weeks. Group 1: Normal control which received normal saline (1ml/100g/day); Group II were alloxan induced diabetic rats, groups III and IV were alloxan induced diabetic rats administered with Glibenclamide (0.60mg/kg), methanol extracts 200mg/kg and 400mg/kg respectively. During the treatment, blood was collected from retro orbital plexus at every week interval and used for determination of blood glucose level. At the end of 4th week, before the sacrifice, blood was collected from retro orbital plexus for the measurement of glucose level.

3. RESULTS AND DISCUSSION

The present study was undertaken to screen the alloxan induced anti-diabetic activity of methanolic extract of *Rosenvingea intricata* using Wistar albino rats. The methanolic extract at the dose level of 200 and 400mg/kg body weight were injected to the treated group and Glibenclamide at the dose level of 600µg/kg was administered to the standard group. The blood glucose levels were observed after 48h induction of alloxan.

Table-1 showed the effect of methanolic extract of *Rosenvingea intricata* on blood glucose levels of alloxan induced diabetes in rats. Administration of alloxan (150mg/kg) produced diabetes in the rats which was confirmed by the elevation of blood glucose levels. The diabetic animals were treated with methanolic extract of *Rosenvingea intricata* and Glibenclamide by oral administration. After 48 hr, the mean blood glucose levels were measured during the test drug administration on 0h, 1h, 3h, 5h and 7h. It was observed that the glucose levels reached to moderate diabetes, thereafter distilled water had given to control group, Glibenclamide (600µg/kg) to the standard group and methanolic extract (200 and 400mg/kg) to the test group. Blood glucose level was measured at 0h, 1h, 3h, 5h and 7h after administration of Glibenclamide to standard group which showed 79, 76, 73, 71 and 70mg/dl respectively.
Table 1: Alloxan induced anti-diabetic activity of methanolic extract of *Rosenvingea intricata* (J.Ag.) Boergesen.

<table>
<thead>
<tr>
<th>Animal groups</th>
<th>Blood glucose level before treatment (mg/dl)</th>
<th>Blood glucose level after 48 hrs. of treatment (mg/dl)</th>
<th>Blood glucose level after drug administration in hours (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Control</td>
<td>70.5±1.1</td>
<td>81.0±5.2</td>
<td>75±5.8</td>
</tr>
<tr>
<td>Alloxan 150mg/kg</td>
<td>72±0.7</td>
<td>195±60.8</td>
<td>193±6</td>
</tr>
<tr>
<td>Glibenclamide 600µg+Alloxan 150mg/kg</td>
<td>70.2±1.0</td>
<td>258±31.5</td>
<td>79±1.4</td>
</tr>
<tr>
<td>200Methanol extract + Alloxan 150mg/kg</td>
<td>70.7±1.2</td>
<td>216±3.3</td>
<td>194±4</td>
</tr>
<tr>
<td>400Methanol extract + Alloxan 150mg/kg</td>
<td>70.7±1.0</td>
<td>224±12.0</td>
<td>206±1</td>
</tr>
</tbody>
</table>

In the groups treated with 200mg/kg methanolic extract of *Rosenvingea intricata*, there was a significant decrease in blood glucose levels to 194mg/dl in 0 hr, 171mg/dl in 1h, 147mg/dl in 3h, 126mg/dl in 5h and 114mg/dl in 7h. The diabetic animals treated with 400mg/kg methanolic extract showed the decreased blood glucose level of 206mg/dl, 201mg/dl, 191mg/dl, 167mg/dl and 143mg/dl within 0h, 1h, 3h, 5h and 7h respectively. From the present investigation, it was noted that 200mg/kg methanolic extract of *Rosenvingea intricata* showed the highest degree of anti-diabetic effect as compared to 400mg/kg methanolic extract.

**4. CONCLUSION**

From the results obtained, it can be concluded that the methanol extract of *Rosenvingea intricata* possess significant anti-diabetic property. Among the two concentrations of methanolic extract studied, 200mg/kg methanolic extract had the highest effect than 400mg/kg. This may prove helpful for developing new drugs from this plant for managing diabetes and associated complications. However further studies required to elucidate the exact mechanism of action and the structure of the secondary metabolites which is responsible for anti-diabetic activity for the development as potent anti-diabetic drug.

**REFERENCES**

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