Effect of Methanolic Extract of Mollugo pentaphylla on Blood Glucose Levels in Streptozotocin Induced Diabetic Rats

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INTRODUCTION
Diabetes mellitus is a metabolic disorder characterized by hyperglycaemia, glycosuria and negative nitrogen balance and it is mainly due to either lack of insulin secretion from beta cells of pancreas or desensitization of insulin receptors for insulin. It is the most prevalent disease in the world affecting 25% of population and afflicts 150 million people and is set to rise to 300 million by 2025. It causes number of complications like retinopathy, neuropathy, and peripheral vascular insufficiencies. Since diabetes mellitus is a multifactorial disease, the treatment is aimed not only at decreasing the blood sugar level to normal limit, but also at correcting the metabolic defects associated with it. There is an increasing demand by patients to use the natural products with anti-diabetic activity. During the past decade, traditional systems of medicines have become a topic of global importance. Plant based medicines are gaining prominence in treatment of metabolic diseases like diabetes. Many flavonoids containing plant serve as a hidden diabetic activity, therefore the present study has been undertaken to evaluate the anti-diabetic action of this plant, therefore the present study has been undertaken to evaluate the anti-diabetic effect of Mollugo pentaphylla in normal and STZ induced diabetic rats.

2. MATERIALS AND METHODS
2.1 Preparation of the Extract
The entire plant of Mollugo pentaphylla was collected from Tirunelveli district, Tamilnadu during the month of July 2008 and was authenticated by a botanist. The dried powdered plant material was extracted with methanol for 72 hours by using soxhlet apparatus. The extract was filtered and concentrated to dryness in vacuum and stored in an air tight container.

2.2 Animals
Wistar albino rats (150-200g) were used for the study. The animals were fed with commercial pellets and water ad libitum. The animals were well acclimatized to the standard environmental conditions of temperature (22°C ± 5°C) and humidity (55 ± 5°C) and 12 hrs light/dark cycle throughout the experimental period.

2.3 Acute Toxicity Studies
The acute oral toxicity study was carried out as per OECD 423 guidelines (OECD, 2001). The study was approved by the Institutional Animal Ethics Committee (IAEC). No mortality and no signs of toxicity were found even after administration of a limit dose of 200 mg/kg body weight of extract; hence 1/10th of the dose was taken as effective dose. Two doses, 200 and 400 mg/kg were selected for the present study to evaluate antihyperglycemic activity.

2.4 Experimental Protocol
The animals were divided into seven groups of six animals each. Group I served as normal control treated with 5 ml of 5% Tween 80. Group II and III diabetic rats treated with MEMP 200 and 400 mg/kg respectively. Group IV diabetic rats orally treated with Glibenclamide (2 mg/kg body weight). Group V served as diabetic control treated with 5 ml of 5% Tween 80.

2.5 Streptozotocin induced Diabetes Mellitus
Diabetes was induced by a single intra peritoneal injection of 150 mg/kg b.wt. of streptozotocin in citrate buffer (pH 4.5). Eight days after injection of STZ, the blood glucose levels of all the rats were determined. The animals which showed 200 mg% of blood glucose level considered for the present study. Diabetes was confirmed in STZ rats by measuring the fasting blood glucose concentration on 4th day after the injection with STZ. The

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extracts at the dose of 200 and 400 mg/kg b.wt. were administered orally after suspending in 5% Tween 80 solution. The blood samples were collected from retro-orbital plexus and blood glucose levels were determined using glucometer

2.6 Statistical Analysis
The data were expressed as mean ± SEM. The significance of the difference between means of the test groups and control group was analysed by using ONE WAY ANOVA followed by Dunnett’s test

3. RESULTS AND DISCUSSION
Acute effects of *Mollugo pentaphylla* in overnight fasted diabetic rats are presented in Table 1. Blood glucose level (BGL) of rats of group II and III were compared with BGL of other rats to confirm that the drug STZ has induced diabetes in experimental animals (P<0.01) at all intervals of sampling. It was noticed that the extract of *Mollugo pentaphylla* resulted in reduction of BGL of 387 to 119 mg/dl and 303 to 160 mg/dl respectively, which was as per with glibenclamide the reduced BGL from 336 to 125 mg/dl at the end of 240 minutes. The research envisaged was designed to evaluate anti-diabetic property of methanolic extract of *Mollugo pentaphylla* (MEMP) in STZ induced diabetic rats by virtue of their antioxidant potential. The result of the study demonstrated the benefits of MEMP as per with standard hypoglycaemic drugs by scavenging oxidative free radicals.

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Dose</th>
<th>Blood Glucose Levels (mg/dl)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0min</td>
</tr>
<tr>
<td>1.</td>
<td>Vehicle, 5% Tween80</td>
<td>5 mg/kg</td>
<td>65.5 ± 4.8</td>
</tr>
<tr>
<td>2.</td>
<td>MEMP</td>
<td>200 mg/kg</td>
<td>303.0 ± 33.1</td>
</tr>
<tr>
<td>3.</td>
<td>MEMP</td>
<td>400 mg/kg</td>
<td>387.3 ± 43.7</td>
</tr>
<tr>
<td>4.</td>
<td>Glibenclamide</td>
<td>2 mg/kg</td>
<td>336.8 ± 50.9</td>
</tr>
<tr>
<td>5.</td>
<td>Diabetic Control</td>
<td>5 mg/kg</td>
<td>470.0 ± 32.1</td>
</tr>
</tbody>
</table>

*P<0.05, **P<0.01

4. CONCLUSION
In conclusion the present study reveals that the *Mollugo pentaphylla* had antihyperglycemic agent. The bioactive component(s) responsible for the observed activity is not precisely known but it may be one or more of the phytochemical constituents established to be present in the whole plant extract. The phytochemical screening of the extract revealed the presence of alkaloids and glycosides in the *Mollugo pentaphylla* plant methanolic extract, which may be the constituents responsible for the activity. Further studies are necessary to isolate the active principle(s) responsible for the activity.

REFERENCES

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