Hypoglycemic effect of aqueous extract of *Parthenium hysterophorus* L. in normal and alloxan induced diabetic rats

Vijay S. Patel, V. Chitra, P. Lakshmi Prasanna, V. Krishnaraju

ABSTRACT

**Objectives:** To study the effects of *Parthenium hysterophorus* L. flower on serum glucose level in normal and alloxan induced diabetic rats.

**Materials and Methods:** Albino rats were divided into six groups of six animals each, three groups of normal animals receiving different treatments consisting of vehicle, aqueous extract of *Parthenium hysterophorus* L. flower (100 mg/kg) and the standard antidiabetic drug, glibenclamide (0.5 mg/kg). The same treatment was given to the other three groups comprising alloxan induced diabetic animals. Fasting blood glucose level was estimated using the glucose oxidase method in normal and alloxan induced diabetic rats, before and 2 h after the administration of drugs.

**Results:** *Parthenium hysterophorus* L. showed significant reduction in blood glucose level in the diabetic (*P*<0.01) rats. However, the reduction in blood glucose level with aqueous extract was less than with the standard drug glibenclamide. The extract showed less hypoglycemic effect in fasted normal rats, (*P*<0.05).

**Conclusion:** The study reveals that the active fraction of *Parthenium hysterophorus* L. flower extract is very promising for developing standardized phytomedicine for diabetes mellitus.

**KEY WORDS:** Diabetes mellitus, hypoglycemia, *Parthenium hysterophorus*
and maintained on standard pellets and water at libitum. The animals described as ‘fasted’ were deprived of food for 18 h, but had free access to water.

Experimental setup

The fasted rats were divided into six groups of six animals each (three groups of normal animals and three groups for induction of diabetes). The normal animals were given the following drug treatment after 18 h of fasting. The diabetic animals were given the same treatment after 72 h of alloxan administration.

**Group A:** (Control): Received 0.5% Tween 80.

**Group B:** (Positive control): Received aqueous suspension of glibenclamide 0.5mg/kg in 0.5 ml of 5% Tween 80.

**Group C:** (Test group): Received aqueous extract of *Parthenium hysterophorus* L. 100 mg/kg with 0.5 ml of 5% Tween 80.

All the drugs were administered in a single dose, with the help of a stomach tube. The dose of the standard drug glibenclamide was calculated on the basis of human dose, based on surface area by extrapolation method.[10] The institutional ethics committee approved all experimental protocol.

**Hypoglycemic study in normal rats**

The fasting blood glucose level was monitored in blood sample collected from the ear vein, using the glucose oxidase method.[12] The blood glucose level of the different groups was estimated 2 h after the administration of the drug. The period of 2 h is based on the finding that the maximum hypoglycemic effect of glibenclamide was found around two hours of administration.

**Hypoglycemic study in Alloxan induced diabetic rat**

Alloxan monohydrate (150 mg/kg body weight) dissolved in normal saline and injected i.p. in 18 h previously fasted animal to induce diabetes. After one hour of alloxan administration, the animals were fed standard pellets and water at libitum.[11] After 72 h, the blood glucose levels were estimated, applying the glucose oxidase method and rats having blood glucose level more than 150 mg/dl were selected for the study. Fasting blood glucose level before and 2 h after the administration of the drug were estimated.

**Estimation of blood glucose**

Blood glucose was estimated by autoanalyser using a commercial assay kit (ERBA diagnostics mannchim GmbH, Germany). The blood sample was centrifuged at 3000 rpm for 20 min and 10 µl serum was used for each assay.[12]

**Results**

In alloxan induced diabetic rats, those animals with blood glucose level in the range of 280-310 mg/dl were considered as severe diabetics. All animals survived without any side effect and mortality. In the test group, the blood glucose level significantly (P<0.01) reduced below 240 mg/dl (21%) at 2 h while in the glibenclamide treated group, the blood glucose level reduced to 30%. In the normal rat, the percent decrease in blood glucose level at 2 h with glibenclamide was 10%, while it was only 6% with *Parthenium hysterophorus* L. extract [Table 1]. The aqueous extract of *Parthenium hysterophorus* L. significantly (P<0.01) decreased fasting blood glucose level in alloxan induced diabetic rat at 2 h. However, reduction in blood glucose level is less than glibenclamide treated group.

**Discussion**

The study reports the hypoglycemic activity of aqueous extract of *Parthenium hysterophorus* L. If the active principle(s) is/are identified, it can lead to the development of a potent allopathic medicine. Further, it is interesting to note that the drug exhibited significant hypoglycemic activity only in alloxan induced diabetic animal, as compared to its effect in normal animals. Alloxan induces diabetes by destroying β-cells of pancreas, through production of reactive oxygen species.[13] Therefore, unlike the clinically used oral sulphonylurease, this herbal drug does not seem to work by stimulating β-cells and releasing insulin. This suggests that its main mechanism of action may not be potentiation of insulin release from pancreatic β-cells and therefore the drug could be effective in insulin independent, type II diabetes mellitus also.

The present study demonstrates that aqueous extract of *Parthenium hysterophorus* decrease glucose level in alloxan induced diabetic animal. Further studies are in progress in the

**Table 1**

**Effect of aqueous extract of *Parthenium hysterophorus* L., on blood glucose level of normal and alloxan induced diabetic rats (n=6).**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment</th>
<th>Dose and route</th>
<th>Normal group</th>
<th>Diabetic group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre-treatment</td>
<td>Post-treatment</td>
</tr>
<tr>
<td>Control</td>
<td>Tween 80</td>
<td>0.5ml/kg (oral)</td>
<td>79.20±0.35</td>
<td>77.01±0.32</td>
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<tr>
<td>Positive control</td>
<td>Glibenclamide</td>
<td>0.5mg/kg (oral)</td>
<td>79.58±0.37</td>
<td>71.22±0.70</td>
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<tr>
<td>Test</td>
<td><em>Parthenium</em></td>
<td>100mg/kg (oral)</td>
<td>80.02±0.49</td>
<td>74.98±0.63</td>
</tr>
<tr>
<td></td>
<td><em>hysterophorus</em> L.</td>
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<tr>
<td>One-way ANOVA</td>
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<td>F</td>
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<td></td>
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<td>2, 15</td>
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<tr>
<td></td>
<td>P</td>
<td></td>
<td>0.746</td>
<td>0.280</td>
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</tbody>
</table>

*P< 0.05; **P< 0.01 as compare to the control*
laboratory to elucidate in detail the actual mechanism of the action of this drug at the cellular and molecular levels.

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References