Alloxan-induced Diabetes in Rabbits and Effect of a Herbal Formulation D-400

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SUMMARY:

Adult male rabbits injected with alloxan (50 mg/kg i.p.) were divided into two groups of nine each. One group received placebo and the other group an aqueous suspension of D-400, at the dose of 1 gm/kg body weight orally daily for 36 weeks. Blood glucose, blood urea and serum creatinine were estimated initially and at every 6-weekly intervals. At the end of 36 weeks D-400 significantly prevented the rise in blood urea and serum creatinine levels as compared to the control. Although a rise in blood sugar was noticed in both the groups, the level of blood sugar after 36 weeks was significantly lower in the D-400 treated group. This shows the favourable response of D-400 against alloxan-induced renal damage and hyper glycaemia.

Key words: D-400; alloxan diabetes; renal damage; rabbits

Diabetic nephropathy is one of the major complications of non-insulin dependent diabetes mellitus (NIDDM) which is a common cause of death in diabetic patients. The severity of renal disease in diabetic patients correlates with the levels of blood urea and serum creatinine. Diabetic nephropathy accounts for considerably morbidity and mortality even in patients with well controlled blood sugar values.

Many indigenous drugs have been reported to lower blood sugar levels in diabetic individuals. D-400 is one such indigenous drug combination which has been studied for its effect on blood sugar levels. The main ingredients of D-400 are Eugenia jambulana, Pterocarpus marsupium, Ficus glomerulata and Ocimum sanctum in addition to other herbs, which have blood sugar lowering effect.

While the effect of D-400 on blood sugar has been studied, no studies have been conducted regarding the effects on renal impairment in diabetic nephropathy. In the present experiment, D-400 has been tried in alloxan-induced diabetes and renal damage in rabbits and the effect on blood glucose, blood urea and serum creatinine has been studied.

MATERIALS AND METHODS

Eighteen adult male rabbits were selected for the study. The rabbits weighed on an average 1 kg and all of them were given alloxan (50 mg/kg, i.p.) after a baseline blood urea, serum creatinine and blood sugar estimation was done. (alloxan in low doses, produces an NIDDM
like state, which can progress to a gradual recovery or to an insulin dependent stage\(^6,7\). The rabbits were divided into two groups of 9 each. One group received D-400 at the dose of 1 gm/kg body weight and the other received normal saline. The dosage of 1 gm/kg of D-400 was arrived at, based on previous experimental trials of 0.5, 1.0 and 1.5 gms/kg.

The biochemical parameters were checked once in 6 weeks for 36 weeks. A comparative analysis was done after the study was concluded. Statistical analysis was done by student’s ‘t’ test.

**RESULTS**

A rise in blood sugar starting one week after alloxan injection followed by a spontaneous and gradual fall was noted in all 18 rabbits. Blood urea and serum creatinine levels showed significant rise in both groups indicating renal damage caused by alloxan. At the end of 36 weeks, blood sugar, urea and serum creatinine levels were significantly lower in the D-400 treated group as compared to the control (Table 1).

![Table 1: Changes in blood glucose, blood urea and serum creatinine in alloxan-induced diabetic nephropathy in rabbits](image)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Initial value</th>
<th>After 1 week</th>
<th>6 weeks</th>
<th>12 weeks</th>
<th>24 weeks</th>
<th>36 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose (mg%)</td>
<td>41.50±3.30</td>
<td>47.17±4.45</td>
<td>169.33±7.78</td>
<td>184.00±8.41</td>
<td>121.00±3.79</td>
<td>115.33±5.07</td>
</tr>
<tr>
<td>Blood urea (mg%)</td>
<td>19.67±2.66</td>
<td>21.67±2.66</td>
<td>20.50±1.61</td>
<td>21.83±1.51</td>
<td>34.50±8.48</td>
<td>28.33±1.85</td>
</tr>
<tr>
<td>Serum creatinine (mg%)</td>
<td>0.74±0.10</td>
<td>0.94±0.20</td>
<td>0.73±0.10</td>
<td>0.95±0.20</td>
<td>1.47±0.17</td>
<td>1.07±0.17</td>
</tr>
</tbody>
</table>

*\(p<0.001\) compared to control.  C=Control, T=Treated

**DISCUSSION**

Many oral hypoglycemic agents are normally metabolised or cleared by the kidneys and so accumulate in uraemic patients thus increasing the risk of hypoglycaemia and toxicity\(^8,9\). In addition to this, these drugs are also associated with long term complications. In the present study D-400 a herbomineral preparation has shown significant hypoglycaemic action and proved to be effective on alloxan-induced nephrotoxicity. It is very difficult to mention which of the ingredients was responsible for this favourable response. According to Ayurvedic texts, a combination of substances is used to get the enhanced desired action and eliminate unwanted side effects\(^10,11\). These ingredients may aid absorption of active principles responsible for hypoglycaemic action and protective action on kidneys. Since small number of animals were used in the present study, some more experimental and clinical trials should be conducted to evaluate the efficacy of this drug on diabetic complications.

**REFERENCES**


