Short Communication

Comparative study of the hypoglycemic effects of coconut water extract of *Picralima nitida* seeds (Apocynaceae) and Daonil in alloxan-induced diabetic albino rats

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The study was designed to compare the hypoglycemic effects of coconut water extract of *Picralima nitida* seeds to that of Daonil in alloxan-induced diabetic albino rats. Twenty five albino rats weighing between 170 - 200 g were randomly divided into five groups after allowing the rats to acclimatize for seven days and were made diabetic by intraperitoneal administration of 150 mg/kg of alloxan. The rats were giving different volumes of the extract and Daonil as per their groupings. All the substances were given for five days by oro-gastric tube. The blood glucose level were measured daily in the rats. There was an initial inactivity in the rats following administration of the extract mixture and their appetite was low except for the control group. The blood glucose levels (in mmols/dL) of the rats at the start and end of the experiment for the groups were: control (9.6 ± 0.1 to 9.2 ± 0.1), coconut water only (11.5 ± 0.3 to 6.2 ± 0.1), aqueous extract of *P. nitida* seeds (12.4 ± 0.1 to 5.8 ± 0.2), coconut water extract of *P. nitida* seeds (11.8 ± 0.2 to 4.2 ± 0.1), and Daonil (10.5 ± 0.4 to 4.3 ± 0.1). Therefore, coconut water extract of *P. nitida* seeds have a significant hypoglycemic effects in alloxan-induced diabetes comparable to that of the Daonil, hence, it could be an effective adjunct in the management of diabetes mellitus.

Key words: Albino rats, alloxan, coconut water, Daonil, diabetes mellitus, *Picralima nitida*.

INTRODUCTION

Diabetes mellitus is a serious lifelong condition that affects an estimated population of about 15 millions and a third of these goes about undiagnosed until many years after the onset (Betheside, 1995). It is a group of metabolic disorders with a common biochemical manifestation; hyperglycemia, hence, it is thus a derangement of carbohydrate metabolism (Murray, 2000). Uncontrolled diabetes mellitus causes varied histopathological changes in different organs (Harold, 1978; Thomas, 1999), and incidences of diabetic neuropathy has been on the increase (Adewole et al., 2006; Carrington and Litchfield, 1999; Clements and Bell, 1982). The underlying causes of diabetic complications have been attributed to hyperglycemia which results in oxidative stress, alterations in enzyme activities, protein glycosylation and several structural changes (Akpan et al., 2007). Alloxan induces diabetes in experimental animals through beta cells destruction (Singh and Gupta, 2007). It has been shown that beta cell apoptosis is related to alloxan-induced inhibition of pancreatic glucokinase function and there is selective beta cell loss, leading to insulinopenic diabetes, analogous to type I diabetes (Gao et al., 2007; Fernandes et al., 2007; Kavitha et al., 2007; Wadood et al., 2007).

Daonil is an oral hypoglycemic agent of sulphonylureas group and is indicated in patients with type 2 diabetes.
Table 1. Weight changes in albino rats before and after the experiment.

<table>
<thead>
<tr>
<th>Group</th>
<th>Before experiment (g)</th>
<th>After experiment (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (2 ml of normal saline)</td>
<td>175 ± 1.0a</td>
<td>176 ± 2.0</td>
</tr>
<tr>
<td>Coconut water only (2 ml)</td>
<td>182 ± 2.0a</td>
<td>180 ± 1.0</td>
</tr>
<tr>
<td>Aqueous extract of <em>P. nitida</em> seeds (2 ml)</td>
<td>178 ± 3.0a</td>
<td>167 ± 4.0b</td>
</tr>
<tr>
<td>Coconut water extract of <em>P. nitida</em> seeds (2 ml)</td>
<td>192 ± 5.0a</td>
<td>178 ± 2.0b</td>
</tr>
<tr>
<td>Daonil (0.5 - 1 mg)</td>
<td>185 ± 2.0a</td>
<td>182 ± 3.0b</td>
</tr>
</tbody>
</table>

n = 25; values are expressed as mean ± SD.

ab: Different superscripts on means ± SD along the same row indicate significant difference (p<0.05).

Table 2. Blood glucose levels (mmol/L) of the albino rats on a daily basis.

<table>
<thead>
<tr>
<th>Group</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (2 ml of normal saline)</td>
<td>9.6 ± 0.1a</td>
<td>9.5 ± 0.2</td>
<td>9.6 ± 0.1</td>
<td>9.2 ± 0.3</td>
<td>9.3 ± 0.1</td>
</tr>
<tr>
<td>Coconut water only (2 ml)</td>
<td>11.5 ± 0.3a</td>
<td>8.1 ± 0.1</td>
<td>7.7 ± 0.3</td>
<td>7.1 ± 0.2</td>
<td>6.2 ± 0.1b</td>
</tr>
<tr>
<td>Aqueous extract of <em>P. nitida</em> seeds (2 ml)</td>
<td>12.4 ± 0.1a</td>
<td>11.9 ± 0.1</td>
<td>8.6 ± 0.1</td>
<td>8.3 ± 0.1</td>
<td>5.8 ± 0.2b</td>
</tr>
<tr>
<td>Coconut water extract of <em>P. nitida</em> seeds (2 ml)</td>
<td>11.8 ± 0.2a</td>
<td>9.6 ± 0.2</td>
<td>6.2 ± 0.1</td>
<td>4.8 ± 0.3</td>
<td>4.2 ± 0.1b</td>
</tr>
<tr>
<td>Daonil (0.5 - 1 mg)</td>
<td>10.5 ± 0.4a</td>
<td>7.2 ± 0.2</td>
<td>6.2 ± 0.3</td>
<td>5.7 ± 0.1</td>
<td>4.3 ± 0.1b</td>
</tr>
</tbody>
</table>

n = 25; values are expressed as mean ± SD (Unit: mmol/L).

RESULTS AND DISCUSSION

There was an initial inactivity in the rats following administration of the extract mixture and their appetite was low except for the control group. There were weight changes within the experimental groups and the control (Table 1). The blood glucose levels of the rats at the start and end of the experiment for the groups are given in Table 2.

Diabetes mellitus has no cure presently; hence, the objectives of any treatment are long-life controlled of blood sugar and preventions of complications. Majority of the modalities available for it treatment are diets, exercise, use of hypoglycemic agents/drugs, and some cases, insulin therapy. The use of cobalt chloride in the treatment of diabetes mellitus in rats showed no significant reduction in the serum glucose concentration (Saker et al., 1998) but acupuncture analgesia was said to be safe and effective therapy for long term management of painful diabetic neuropathy (Abuaisa et al., 1998). The results indicate a gradual decrease in the diabetic levels of the rats for all the groups except for the control group.
The decease in the aqueous picralima seed extract group only was not sufficient enough to render the rats adiabatic within five days, but became more pronounced in the coconut water extract of the picralima seeds. The mechanism by which the aqueous extract of *P. nitida* does this may be independent of the availability of insulin from pancreatic β-cells (Inya-Agha, 1999). However, the coconut water extract of the picralima seeds produced significant hypoglycemia in the rats comparable to that of Daonil, and the mechanism of action to reduce the blood glucose may be due stimulation of influx of glucose into the cells for metabolism. The coconut water may provide an enabling medium that facilitate the extraction of the active components of *P. nitida* seeds extract and uptake in the rats. Therefore, the coconut water extract of *P. nitida* seeds have a significant hypoglycemic effects in alloxan-induced diabetes comparable to that of the Daonil, and could serve as an effective adjunct in the management of diabetes mellitus.

REFERENCES


