The hypoglycemic activity of *Coccinia indica* Wight & Arn. and its influence on certain biochemical parameters

Sir,

*Coccinia indica* Wight & Arn. (Cucurbitaceae), which is grown abundantly in India have been widely used in the traditional treatment of diabetes mellitus.  

Contradictory findings on the antidiabetic activity of the different parts of *Coccinia indica* have been reported. The alcoholic extract of *Coccinia indica* was found to be more active in reducing blood glucose level; this extract was subjected to further fractionation and evaluation on antidiabetic activity and biochemical parameters.

Aerial parts of *Coccinia indica* were collected, dried under shade, powdered and the alcoholic extract was prepared. The dried alcoholic extract was a semisolid mass and was successively extracted with toluene, chloroform, ethyl acetate and n-butanol, concentrated and dried in a dessicator. The material left over was labeled as residual fraction. All the fractions were suspended in 0.3% carboxy methyl cellulose (CMC) just before administration to rats.

Rats were made diabetic by injecting alloxan monohydrate intraperitoneally at a dose of 120 mg/kg, b.w. in chilled citrate buffer pH 4.5. After 72 h rats showing blood sugar levels of 200 - 350 mg/dl were considered as diabetic and were employed in the study. The rats were housed in polypropylene cages and divided into seven groups of six animals each. Group I served as diabetic control and received 0.3 % CMC orally, Group II was the positive control group and received phenformin (30 mg/kg, b.w.). Groups III to VII received suspension of fractions, orally twice daily at a dose of 150 mg/kg for nine days. (The dose of the fractions was selected on the basis of a pilot study).

On the ninth day the animals were fed with the respective fractions, fasted for 3 h and blood samples (1 ml) were collected by orbital sinus puncture under mild ether anesthesia in Eppendorf's tubes containing 50 microlit of anticoagulant (10% trisodium citrate solution). Plasma was separated by centrifugation at 5000 rpm for 10 minutes and analyzed for glucose content, total protein, cholesterol, triglycerides (TGL), alkaline phosphatase (ALP), aspartate amino transferase (AST) and alanine amino transferase (ALT) in Autoanalyzer Microlab 200 using Ecoline-kits (E merck). The study was approved by the institutional Animals Ethics Committee. Utmost care was taken to ensure that the animals were treated in the most humane and ethically acceptable manner.

Data are expressed as mean±SEM. The biochemical parameters were analyzed statistically using one-way ANOVA followed by Dunnett’s multiple comparison test (DMRT). The glucose levels before and after the administration of different fractions were compared using paired Students ‘T’ test. The minimum level of significance was fixed at $P<0.05$.

Among the fractions tested, only the toluene sub-fraction

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<table>
<thead>
<tr>
<th>Group</th>
<th>Dose(mg/kg)</th>
<th>Glucose level (mg/dl) before drug treatment</th>
<th>After drug treatment</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before drug treatment</td>
<td>After drug treatment</td>
<td></td>
</tr>
<tr>
<td>Solvent control</td>
<td>—</td>
<td>271.33 ± 32.38</td>
<td>314.66 ± 31.22</td>
<td>+15.9</td>
</tr>
<tr>
<td>Positive control (Phenformin)</td>
<td>30</td>
<td>288.67 ± 31.12</td>
<td>144.67 ± 34.44*</td>
<td>-49.8</td>
</tr>
<tr>
<td>Toluene fraction</td>
<td>150</td>
<td>283.00 ± 21.28</td>
<td>206.00 ± 23.54*</td>
<td>-27.2</td>
</tr>
<tr>
<td>Chloroform Fraction</td>
<td>150</td>
<td>284.00 ± 18.58</td>
<td>257.00 ± 16.85</td>
<td>-9.5</td>
</tr>
<tr>
<td>Ethyl acetate fraction</td>
<td>150</td>
<td>285.33 ± 17.97</td>
<td>257.00 ± 12.34</td>
<td>-9.9</td>
</tr>
<tr>
<td>n-Butanol fraction</td>
<td>150</td>
<td>260.67 ± 26.59</td>
<td>282.67 ± 23.10</td>
<td>+08.4</td>
</tr>
<tr>
<td>Residual fraction</td>
<td>150</td>
<td>239.00 ± 23.71</td>
<td>276.67 ± 25.69</td>
<td>+15.8</td>
</tr>
</tbody>
</table>

The values are mean±SEM (n=6 in each group). " + " denotes increase and " — " denotes decrease in hyperglycemic activity. *P < 0.01 in comparison to corresponding value before treatment
was found to be effective in reducing blood sugar level (Table 1). This fraction was taken for further biochemical evaluation (Table 2).

A significant increase in the cholesterol (P<0.001) and TGL (P<0.01) levels was observed in the diabetic group. The toluene fraction prevented the elevation of lipid profile significantly (P<0.001) in comparison to control diabetic rats. A significant increase in ALP (P<0.02), AST (P<0.01) and ALT (P<0.05) levels was found in diabetic rats and the toluene fraction significantly prevented the elevation of AST (P<0.01) and ALT (P<0.02) levels but not that of ALP. There was a marked decrease in the plasma protein content in the diabetic group (P<0.05) and the toluene fraction could not attenuate it.

Insulin deficiency leads to various metabolic aberrations in the animals, viz. increased blood glucose, decreased protein content, increased cholesterol, ALP and transaminases. Nikkhila and Kekki (1973) reported an increase in serum TGL and cholesterol levels in diabetic rats and these lipid levels were significantly controlled in the toluene fraction-treated diabetic rats. The increased levels of transaminases which are active in the absence of insulin because of the availability of amino acids in the blood of diabetics are responsible for the increased gluconeogenesis and ketogenesis observed in diabetes. The restoration of AST and ALT to their normal levels by the toluene fraction may also indicate the revival of insulin secretion to near normal levels. This could be confirmed only if the insulin levels are estimated.

The results of the present study indicate that the toluene fraction was the only active fraction. The active principles in this fraction were found to be triterpenes which may be responsible for the antidiabetic activity and correction of the altered metabolic functions. The mechanism of action of these principle(s) may be due to their β cell restorative properties against alloxan-induced damage. However, further comprehensive chemical and pharmacological investigations need to be carried out to elucidate the exact mechanism of action.

**Acknowledgement**

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**References**