Short report

Antioxidant compounds from *Ebenus pinnata*

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Abstract

Activity-guided fractionation of the methanol extract of *Ebenus pinnata* aerial parts led to the isolation of ombuoside (1), kaempferol 3-O-rutinoside (2), rutin (3), catechin (4), and picein (5), along with β-sitosterol and β-sitosterol glucoside. Compounds 1–4 showed significant antioxidant activity in the DPPH, and TEAC, reducing power assays.

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Keywords: *Ebenus pinnata*; Flavonoids; Antioxidant activity

1. Plant

*Ebenus pinnata* Ait. (Leguminosae), aerial parts collected at Chott Mériem Sousse (Tunisia), in May 1999 were authenticated by Dr. F. Harzallah-Skhiri. A voucher specimen has been deposited in the Ecole Supérieure d’Horticulture et d’Elevage de Chott Mériem, Université de Sousse, Tunisie.

2. Uses in traditional medicine

No reports.

3. Previously isolated compounds

No reports.

4. New isolated compounds

Ombuoside (quercetin-4′,7-dimethoxy-3-O-rutinoside) (1) [1], kaempferol-3-O-rutinoside (2) [2], rutin (3) [3], catechin (4) [4], picein (4-O-β-D-glucopyranosyl acetophenone) (5) [5], β-sitosterol, and β-sitosterol glucoside.

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5. Studied activity

Antioxidant activity evaluated using three different assays [6]: DPPH (2,2-diphenylpicryl hydrazyl) scavenging activity [7], ABTS$^{+}$ scavenging activity according to the modified TEAC method of Re et al. [8], and reducing power assay according to the method of Oyaizu [9].

6. Tested material

Methanol extract of *E. pinnata* aerial parts, CHCl$_3$ and EtOAc fractions obtained from partition with a suspension of the MeOH extract in water, and compounds 1–4.

7. Results

Reported in Table 1.

8. Conclusions

These results are in agreement with reported structure–activity relationships for flavonoid antioxidants, whose scavenging effects depend on the hydroxylation pattern of rings A, B, and C, $O$-methylation, the presence of a 2,3 double bond in conjugation with a 4-oxo function, glycosylation, and degree of polymerization [10–13]. As expected,
compounds bearing the orthodiphenolic structure in the B ring (3 and 4) are more active than the O-methylated derivative 1, and the 4′-hydroxylated compound 2. Regarding the significance of Δ2 and a 4-carbonyl group for the antioxidant activity, no consistent correlation could be identified from previous systematic studies of flavonoids [10,12]. For example, catechin (4) lacks the unsaturated system in ring B but showed the highest activity in the DPPH assay. When compared to quercetin, compound 3 shows less activity due to the glycosylation at C-3. The results here presented indicate that flavonoids constitute the antioxidant principles of E. pinnata.

Acknowledgments

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References


Table 1
Antioxidant activity of compounds 1–4, MeOH extract, CHCl3, and AcOEt fractions from E. pinnata

<table>
<thead>
<tr>
<th>Material</th>
<th>DPPH radical (μg/ml)</th>
<th>ABTS TEAC (mM)a</th>
<th>Reducing power IC50 (μg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49.05 ±5.88</td>
<td>0.87 ±0.08</td>
<td>193.72 ±4.5</td>
</tr>
<tr>
<td>2</td>
<td>37.77 ±1.47</td>
<td>1.59 ±0.04</td>
<td>108.77 ±5.3</td>
</tr>
<tr>
<td>3</td>
<td>16.15 ±0.27</td>
<td>2.50 ±0.05</td>
<td>40.06 ±1.8</td>
</tr>
<tr>
<td>4</td>
<td>9.24 ±0.12</td>
<td>2.11 ±0.06</td>
<td>29.58 ±0.8</td>
</tr>
<tr>
<td>MeOH extract</td>
<td>&gt;1000</td>
<td>–</td>
<td>844.7 ±7.9</td>
</tr>
<tr>
<td>CHCl3 fraction b</td>
<td>–</td>
<td>0.83 ±0.16</td>
<td>1081.0 ±12.5</td>
</tr>
<tr>
<td>EtOAc fraction c</td>
<td>637.61 ±7.96</td>
<td>1.55 ±0.12</td>
<td>740.0 ±8.6</td>
</tr>
<tr>
<td>Quercetin</td>
<td>–</td>
<td>–</td>
<td>21.9 ±0.3</td>
</tr>
<tr>
<td>Tocopherol</td>
<td>–</td>
<td>4.00 ±0.12</td>
<td>136.83 ±0.2</td>
</tr>
</tbody>
</table>

a TEAC values were calculated at 15 min.
b No activity observed.
c Not determined.