SHORT COMMUNICATIONS

Antiinflammatory Activity of the Leaves of Anacardium occidentale Linn

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Ethanolic crude extract of Anacardium occidentale leaves and its five different crude fractions,
petroleum ether, solvent ether, ethyl acetate, butanol and butanone were subjected to prelimi-
nary qualitative chemical investigations. The ethanolic extract and all other fractions were
screened for antiinflammatory activity in albino rats (300 mg/kg). Ethanolic extract and butanone
fraction exhibited significant antiinflammatory activity when compared with control and stan-
dard drug diclofenac sodium (100 mg/kg).

The search for antiinflammatory and analgesic agent
in modern times was marked by the introduction of salicin
for the treatment of inflammatory swellings due to rheumatic
fever and rheumatoid arthritis1. Herbal drugs are being
proved as effective as synthetic drugs with lesser side ef-
fects. Herbal medicines are in line with nature, with no haz-
ardous reactions2. Of late the interest in the plant products
rose all over the world due to the belief that many herbal
medicines are known to be free from side effects, although
this statement can be debatable. Furthermore, the fact that
the discovery of a new synthetic drug is time consuming,
expensive affair, and if we want to implement “Health for All
by the year 2000”, then perhaps the logical choice would be
in exploring plant products as potential medicines to the
maximum possible usage3. Due to the increasing frequency
of intake of NSAIDs and their reported common side ef-
facts, there is need to focus on the scientific exploration
of herbal drugs having fewer side effects. Anacardium
occidentale (Anacardiaceae) is a small spreading, evergreen
tree, with a short thick crooked trunk, commonly known as
cashew sometimes reaching a height of 12 m native to tropi-
cal America and naturalized in the warmer parts of India
especially near the sea4. Various parts of this plant are used
in the traditional systems of medicine. The fruit is acrid,
sweet, hot, digestible, aphrodisiac, anthelmintic, tumors,
ascites, fever, ulcers, leucoderma and skin diseases, dys-
entery, and piles. Decoction of the bark is used in diarrhea,
diabetes, swellings and mouth ulcers. The bark and leaves
are used in curing toothaches and sore gums56.

Literature survey revealed that (-)-epicatechin, a
biflavonoid isolated from Anacardium occidentale possessed
significant antiinflammatory activity7. Beta-sitosterol, stig-
masterol, sapoesterol and cholesterol were isolated from
the petroleum ether (60-80°) extract of the bark of
Anacardium occidentale8. Myricetin, agathisflavone,
robustaflavone, amentoflavone, quercetin, kaempferol, api-
genin and two glycosides viz., quercetin-3-O-rhamnoside
and quercetin-3-O-glucoside, are present in the methanol
extract of the leaves8.

Chloroform and methanol extracts of Anacardium
occidentale bark and nut shell have been found to possess
antimicrobial activity against gram-positive and gram-nega-
tive organisms9. Tannins obtained from the bark of
Anacardium occidentale are found to possess

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antiinflammatory activity. So far very little is known about the biological activities of the leaf constituents, therefore in the present study, we report the preliminary chemical evaluation and antiinflammatory activity of the various extracts of the leaves of Anacardium occidentale.

The leaves were collected from a horticulture garden in Goa, India during December 1999 and were authenticated at the Department of Dravya Guna, K.L.E.'s B.M.K. Ayurvedic Medical College, Belgaum, India. A voucher specimen (A.C.-1) has been kept in our laboratory for future reference. In the present study, air dried leaves of Anacardium occidentale, around 1.5 kg were reduced to a fine powder and was subjected to hot continuous extraction with ethanol (95%) in 10 batches of 150 g each in a Soxhlet extractor. After the complete extraction, the solvent was distilled off and concentrated on a water bath to a dry residue.

The concentrated ethanol extract (about 250 g) was dispersed in 250 ml of distilled water and subjected to fractionation by using petroleum ether (40-60°C), solvent ether, ethyl acetate, butanol and butanone in succession. Each fraction was washed with water, then dried over anhydrous Na₂SO₄ (sodium sulphite) and concentrated to a small volume and then evaporated to dryness. The dried ethanolic extracts and its fractions were stored in a desiccator and used for further experiment after suspending in gum acacia 2%. The chemical constituents of the ethanolic extract and its fractions were identified by preliminary qualitative analysis and confirmed by high-performance thin layer chromatography (HPTLC) for the presence of sterols, flavonoids and tannins.

Wister rats of either sex (180-200 g; M/S V. Mastiholi and co., Bangalore, India. Approved from CPCSEA Reg. No. 276.) were housed in standard metal cages. They were provided with food and water was freely available. The rats were allowed a one-week acclimatization period before the experimental sessions. The study was cleared from animal ethical committee of the institution.

The method of Winter et al. was used to evaluate antiinflammatory activity. The rats were divided into eight groups (each group containing 6 animals). Gum acacia 2% was used as vehicle, the suspensions of all the fractions were prepared in gum acacia and administered orally. The first group served as control and received vehicle only (5 ml/kg gum acacia 2%), second group of animals were administered standard drug diclofenac sodium through intraperitoneally (100 mg/kg). The animals of the third, fourth, fifth, sixth, seventh and eighth groups were treated with ethanol, petroleum ether, solvent ether, ethyl acetate, butanol and butanone fractions, respectively through oral route. A dose of 300 mg/kg was selected on basis of the acute toxicity studies.

A mark was made on both the hind paws just below the tibio-tarsal junction so that every time the paw could be dipped in the mercury column of plethysmograph upto the mark to ensure constant paw volume. After 30 mm of above treatment an inflammatory oedema was induced in the left hind paw by injecting 0.05 ml of carrageenan 1% w/v in saline, in the planter tissue of all the animals. The paw volume was measured at 1 h and followed by every hour till the 4 h after administration of carrageenan to each group. The difference between the initial and subsequent reading gave the actual oedema volume.

Per cent inhibition of inflammation was calculated using the formula, % inhibition = \(100 \times (1 - \frac{V_c}{V_t})\), where 'Vc' represents oedema volume in control and 'Vt' oedema volume in-group treated with test compound. The data were analysed using student's 't' test and the level of significance was set at \(P<0.001\).

The average percentage yield of ethanolic (95%) extract of leaves of Anacardium occidentale was found to be 27.2% w/w and the corresponding values for petroleum ether fraction 4%, solvent ether fraction 5.2%, ethyl acetate fraction 7.8%, butanol fraction 12%, butanone fraction 25.6% w/w, respectively. Out of all the samples tested for antiinflammatory activity, the butanone fraction showed significant (\(P<0.001\)) oedema suppressant activity to that of diclofenac sodium in 3 h and 4 h followed by the ethanolic extract. The results are shown in Table 1.

On preliminary phytochemical screening of the leaves of Anacardium occidentale, the presence of sterols, tannins and flavonoids is indicated and on pharmacological screening of the crude extracts of Anacardium occidentale ethanolic extract and its butanone fraction exhibited significant antiinflammatory activity.

Pain, swelling and fever has been treated with Anacardium occidentale leaves in the traditional system of medicine. Tannins obtained from the bark of Anacardium occidentale are found to possess antiinflammatory activity. Thus our results, support the antiinflammatory activity of Anacardium occidentale as claimed in the Ayurvedic Literature. Thus it can also be concluded that antiinflammatory activity may be due to combined effect of sterols, tannins and flavonoids.
TABLE 1: EFFECT OF VARIOUS EXTRACTS OF ANACARDIUM OCCIDENTALE ON CARRAGEENAN INDUCED RAT
PAW ODEMA.

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose</th>
<th>Mean increase in paw volume (ml) ± SEM</th>
<th>% of oedema inhibition at 4 h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 h</td>
<td>2 h</td>
</tr>
<tr>
<td>Control</td>
<td>5 ml/kg**</td>
<td>0.45±0.06</td>
<td>0.49±0.09</td>
</tr>
<tr>
<td>Standard</td>
<td>100 mg/kg</td>
<td>0.19±0.01</td>
<td>0.23±0.00</td>
</tr>
<tr>
<td>Pet, ether</td>
<td>300 mg/kg</td>
<td>0.31±0.04</td>
<td>0.38±0.06</td>
</tr>
<tr>
<td>(40°-60°) Solvent ether</td>
<td>300 mg/kg</td>
<td>0.36±0.01</td>
<td>0.39±0.06</td>
</tr>
<tr>
<td>Ethyl acetate</td>
<td>300 mg/kg</td>
<td>0.33±0.04</td>
<td>0.34±0.07</td>
</tr>
<tr>
<td>Butanol</td>
<td>300 mg/kg</td>
<td>0.38±0.05</td>
<td>0.42±0.05</td>
</tr>
<tr>
<td>Butanone</td>
<td>300 mg/kg</td>
<td>0.21±0.0</td>
<td>0.23±0.00</td>
</tr>
<tr>
<td>Ethanol</td>
<td>300 mg/kg</td>
<td>0.20±0.05</td>
<td>0.24±0.03</td>
</tr>
</tbody>
</table>

Significance relative to respective control values: *P<0.001; N=6 (N indicates no. of animals used in each group) **Gum acacia 2% as vehicle.

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