Evaluation of anti-inflammatory activity of Trichosanthes dioica R. Leaves

Nitin Kumar, Sunil Kumar, Vijay Sharma, Anurag Chaudhary

Abstract
Trichosanthes dioica R. (T. dioica) is an easily available common plant. The plant belongs to family Cucurbitaceae which has given us many important medicinal plants like Momordica charantia, Citrullus colocynthis etc. from which important pharmacological activities and markers like charantin and Cucurbitacin have been reported and isolated. In the present study T. dioica was evaluated for anti-inflammatory activity using carrageenan induced acute inflammation model in rats. It was concluded that leaves of T. dioica possess moderate anti-inflammatory activity.

Keywords: Trichosanthes dioica, carrageenan, anti-inflammatory activity

Introduction
Trichosanthes dioica R. is an important medicinal herb. In Charak Samhita, leaves and fruits used for treatment of alcoholism, jaundice, oedema and alopecia.[1] Over 20 species of Trichosanthes are recorded in Asia of which two namely T. dioica and T. anguina are cultivated as vegetable. [2] Trichosanthes dioica (Pointed gourd) is known by the name of parval, palval, parmal, patol, potala in different parts of India and Bangladesh and used as antipyretic, diuretic, cardiotonic and laxative [3]. The fruit and leaves is the edible part of the plant which is cooked in various ways either alone or in combination with other vegetables or meats [4]. Juice of leaves of T. dioica is used as tonmic, febrifuge and in subacute cases of enlargement of liver and spleen. [5] The various chemical constituents present in T. dioica are vitamin A, vitamin C, tannins, saponins. [6] The leaves of T. dioica are used in oedema ethnopharmacologically (Shaarangadhara Samhita), but no scientific data for both activities is available yet. Therefore it was thought to investigate anti-inflammatory potential of the leaves of T. dioica using carrageenan induced acute inflammation model in rats.

Materials and Methods
Collection and authentication of plant material
Leaves of T. dioica were collected from local area of Lucknow (U.P.) India, during the month of October and authenticated by Division of Taxonomy, National Botanical Research Institute (NBRI), Lucknow, India and a voucher specimen was deposited for future references (Ref. No. NBRI/CIF/128/2010).

Animals
Healthy male Wistar albino rats each weighing 100-120g were used for study. The rats were housed in polypropylene cages and maintained under standard conditions (12 h light and dark cycles, at 25 ±3°C and 35-60% humidity). Standard pelletized feed and tap water was provided ad libitum.

Ethical approval
The experiments were performed as per protocols set by CPCSEA which was duly approved by Institutional Animal Ethical Committee (Approval No. BBDNITM/IAEC/23/2010).

Acute oral toxicity
Wistar albino rats, fasting, for 24 h were administered, ethanolic and aqueous extracts of T. dioica leaves at 2000 mg/kg, p.o. The animal were observed for 24 h. the animal survived and therefore 4 more animals were dosed at the same dose i.e. 2000 mg/kg, p.o. and were observed for 24 h. [7]
Experimental procedure for anti-inflammatory activity
Carrageenan induced rat paw edema
Four groups of albino rats having five animals in each were formed. Group-A Treated orally with vehicle (3ml/kg), Group-B Diclofenac (12.5 mg/kg), Group-C Aqueous extract, Group-D Ethanol extract of leaves suspended in the vehicle, 60 min prior to an injection of 0.1 ml 1% carrageenan into the plantar tissue of the right hind paw. Paw volume of each animal of all groups was measured by plethysmography at 0, 1, 2 and 3 h after carrageenan injection.
Edema was assessed in terms of volume of mercury displaced by the paw before and at 1, 2, & 3 hours after induction of inflammation \[12, 13\]
Inhibition (%) = 100\[1- (a-x/b-y)\]
Where
\[a = \text{mean paw volume of treated animals after carrageenan injection}\]
\[x = \text{mean paw volume of treated animals before carrageenan injection}\]
\[b = \text{mean paw volume of control animals after carrageenan injection}\]
\[y = \text{mean paw volume of control animals before carrageenan injection}\]

Statistical analysis
The results were expressed as mean ± SEM and statistically analyzed by ANOVA followed by Dunnett’s test, with level of significance set at \(p<0.05\) and \(p<0.01\).

Results
Acute oral toxicity
Wistar albino rats, fasting, for 24 h were administered, ethanolic and aqueous extracts of \(T. \) dioica at 2000 mg/kg, p.o. The animal was observed for 24 h. the animal survived and therefore 4 more animals were dosed at the same dose i.e. 2000 mg/kg, p.o. and were observed for 24 h. All five animals survived. Therefore 2000 mg/kg dose was considered safe and 1/10th of the dose was selected for further evaluation.

Anti-inflammatory effect

Table 1: Effect of extracts on paw edema induced by carrageenan in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Dose (mg/kg)</th>
<th>Mean paw volume ± SEM (ml) and % Inhibition</th>
<th>Time after Carrageenan injection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before Carrageenan</td>
<td>0h</td>
</tr>
<tr>
<td>A Control</td>
<td>-</td>
<td>0.32±0.007</td>
<td>0.51±0.01</td>
</tr>
<tr>
<td>B Standard</td>
<td>12.5</td>
<td>0.34±0.007</td>
<td>0.37±0.007** (84.21%)</td>
</tr>
<tr>
<td>C Ethanolic extract</td>
<td>200</td>
<td>0.34±0.01</td>
<td>0.47±0.01* (31.57%)</td>
</tr>
<tr>
<td>D Aqueous extract</td>
<td>200</td>
<td>0.31±0.007</td>
<td>0.47±0.01* (15.78%)</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SEM, \(n=5\), *\(p<0.05\), **\(p<0.01\) considered as significant (compared with control group) using one way ANOVA followed by Dunnett’s test

Fig 1: Graph showing the effects of extracts on paw volume of albino rats

Fig 2: Graph showing % inhibition of paw edema in treated groups
Discussion

In carrageenan-induced acute inflammation model paw volume of each animal of all groups was measured by plethysmograph method, at 0 h (before) & 1, 2, 3 h after carrageenan injection (Table 1). In the duration of first hour aqueous extract (200 mg/kg) showed the mild anti-inflammatory activity i.e. 15.78% inhibition of inflammation, but ethanolic extract (200 mg/kg) showed 31.57% inhibition of inflammation. This initial potential of ethanolic extract indicated the more potency of it in comparison of aqueous extract (200 mg/kg). In the duration of second hour anti-inflammatory activity of aqueous extract increased to 29.41%, ethanolic extract 35.29% & standard (Diclofenac) 88.23%. In the duration of third hour anti-inflammatory activity of aqueous extract increased to 38.88%, ethanolic extract 44.44% & diclofenac (12.5 mg/kg) 88.88%. From the graph shown in Figure 1 & 2, it can be suggested that both the extracts have exhibited the inhibitory effect but lesser than standard.

Thus in the duration of 3 hours, the ethanolic extract (200 mg/kg) showed better inhibition of rat paw edema than aqueous extract. It was nearly half to the standard drug diclofenac (12.5 mg/kg, p.o.).

So it can be suggested that both the extracts have anti-inflammatory effect but ethanolic extract have much better effect (44.44% inhibition of inflammation) than effect of aqueous extract (38.88% inhibition of inflammation) at the end of 3h. Thus the edema suppressant effects of both the extracts were found to be moderate at the end of 3 hours & significant (p<0.01) as compared to control.

Conclusion

From the pharmacological study for anti-inflammatory activity of *T. dioica* leaves it can be concluded that both the ethanolic & aqueous extracts of leaves at 200 mg/kg dose posses significant anti-inflammatory activity than control. Although the protections provided by ethanolic & aqueous extracts were less as compare to standard still both has a potential to be used as moderate anti-inflammatory agent. It can also be concluded that ethanolic extract at 200 mg/kg dose posses superior anti-inflammatory activity than aqueous extract of *T. dioica* at the similar dose level. The study in the direction of elucidating the mechanism of anti-inflammatory activity needs to be conducted.

References