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Comparative Studies on Anti- Inflammatory Activity of *Coriandrum Sativum, Datura Stramonium* and *Azadirachta Indica*

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ABSTRACT
Coriandrum sativum, Datura stramonium and Azadirachta indica are traditionally used in treatment of inflammation. Ethanolic extracts of fruits of Coriandrum sativum, leaves of Datura stramonium and Azadirachta indica were subjected to preliminary screening for anti-inflammatory activity in albino rats. All ethanolic extracts exhibited significant anti-inflammatory activity comparable to the standard drug Diclofenac sodium against carrageenan induced rat paw edema method. Among these plant Azadirachta indica showed maximum anti-inflammatory activity every hour.
KEY WORDS: *Coriandrum sativum, Datura stramonium, Azadirachta indica, Carrageenan*

INTRODUCTION

For the screening of anti–inflammatory activity, the plants which were used are *Coriandrum sativum* Linn is commonly known as Dhania or Dhana (Umbelliferae). It yields 0.3 to1% of volatile oil, 90% of D- linalool, coriandryl acetate, L-borneol, geraniol and pinene [1]. Its leaves were also rich in Vitamin A content [2].Traditionally its fruits as well as volatile oil were used as an aromatic, carminative, stimulant and flavouring agent [3]. *Datura stramonium* Linn. is commonly known as Shivapriya (Solanaceae). Its chemical constituents are tropane, hyoscyamine, glycosides of quercitin and kaempeferol, coumarins and tannins [4, 5]. It was used as a parasympatholytic, CNS depressant, cough, antihelminthics, antiparastic, expectorant, antispasmodic [6]. *Azadirachta indica* is commonly known as Neem (Meliaceae) [7]. Its chemical constituents are diterpenes-sugiol, nimbol, triterpenes-β-sitosterol, stigmasterol, nimaton, quercitin, myrecetin, kaempferol, nimbidin, salanin and azadiradione [8]. It was used as astringent, antiseptic, demulcent, refrigerant, appetizer, insect repellant, malaria, inflammation, diabetes [9].

MATERIALS AND METHODS

Plant material

Fruits of *Coriandrum sativum*, leaves of *Datura stramonium* and *Azadirachta indica* were collected from Bhopal (M.P.). They were authenticated by plant taxonomist Dr. A. B. Tiwari. A voucher specimen has been deposited in the herbarium of institute (Pharm/1061, 1062, 1063 respectively). The plant materials were washed thoroughly in water, chopped, air dried for a week at $35^0 – 40^0$C and pulverized in electric grinder. The powder obtained was defatted with petroleum ether and successively extracted with ethanol. The extracts were concentrated under reduced pressure and dried. All these extracts were evaluated chemically by performing the qualitative chemical tests [10].

Phytochemical studies

All the extracts gave positive test for alkaloid, volatile oil, carbohydrates and flavonoids (Table.1).

Experimental animals

Healthy albino rats of either sex (Wister strain) weighing 100-160 gm were used in present study. The animals had free access to food and water were maintained under controlled temperature (27 ± 2^0C) and 12 h; 12 h light and dark cycle. Initial body weight of animal was recorded.

Acute toxicity studies

Coriandrum sativum, Datura stramonium and *Azadirachta indica* extracts at different doses (50-1500 mg/kg) were administered orally to normal rat. During the Ist four hours after the drugs administration, the animals were observed for gross behavioral changes if any for seven days. The parameter such as hyperactivity, grooming, convulsions, sedation, hypothermia, mortality was observed. No mortality observed with oral administration of all the extracts even at the highest dose (1500 mg/kg). Institutional Animal Ethical Committee (1196/a/08/CPCSEA) has approved the experimental protocol and care of animals was taken as per the guidelines of CPCSEA, Department of Animal Welfare, Government of India.

Test for Anti-inflammatory Activity

These ethanolic extracts were tested for anti-inflammatory activity by carrageenan induced rat paw edema [11]. Healthy albino rats of either sex, weighing 100 -160 gm were selected and provided a standard rat food (I have procured animal feed from Mr. Rayans Biotechnology Pvt. Ltd, Tarnaka Hyderabad-17) and water *ad libitum*. Before the experiment, food was withdrawn overnight but adequate water was given to the rats. Doses selected were 50 mg, 100 mg and 200 mg/kg for each extract. Since 50 mg and 100 mg/kg did not show significant activity; the results at these doses are not presented and discussed. The animals were divided into 5 groups of 6 animals each. The first group (control group) receives acacia (5%, 10ml/kg). The second group received Diclofenac sodium (5 mg/kg, positive control). The third, fourth and fifth groups received ethanolic extract (200 mg/kg) of fruits of *Coriandrum sativum*, leaves of *Datura stramonium* and *Azadirachta indica.* All the drugs were given orally half an hour before the administration of carrageenan suspension. Acute inflammation was produced by the sub-planter administration of 0.1 ml of 1% carrageenan in normal saline in the left hind paw of the rats. The paw volume was measured at 0, 1, 3 and 5 hours with the help of plethysmometer. The average paw swelling in the group of extract treated rat was compared with control group and standard group and percent change in edema was calculated.

Statistical analysis

Results were subjected to statistical analysis by ANOVA and results were expressed as mean± SEM.

RESULTS AND DISCUSSION

Ethanolic extract of fruits of *Coriandrum sativum*, leaves of *Datura stramonium* and *Azadirachta indica* showed a significant ($p<0.01$) inhibition of carrageenan induced rat paw edema and the results are presented in table -2. The extract of *C. sativum, D. stramonium* and *A. indica* showed 40.81%, 39.43% and 46.47% edema inhibition respectively after third hour at 200 mg/kg dose. Maximum activity was found at 3.0 hr intervals with each dose. Among these plant *Azadirachta indica* showed maximum anti-inflammatory activity every hour. The inflammation induced by carrageenan is biphasic in nature. The initial phase of edema has been attributed to the release of histamine and serotonin; the edema maintaining during the plateaue phase, attribute to kinin like substances and the second accelerating phase of swelling is attributed to the release of prostaglandin [12, 13]. Since the extract of *C. sativum, D. stramonium* and *A. indica* inhibited the carrageenan induced edema that involves release of histamine and serotonin in the first phase; hence the inhibitory effect of the extracts could be partly due to inhibition of mast cell mediator release.

Table.1 Phytochemical Parameters of Ethanolic Extract of Plants are as follows

Chemical test	*Datura Stramonium*	*Coriandrum Sativum*	*Azadirachta Indica*
1.Test for Alkaloids			
a. Hager's test	+	+	+
b. Wagner's test	+	+	+
c. Dragendroff's test	+	+	-
2.Test for Carbohydrates			
a. Molisch's test	+	+	+
b. Benedict's Test	+	+	+
3 Test for Fixed oil & Fat			
a. Spot test	—	—	—
4. Test for Volatile oil			
a. Spot test	+	+	+
5. Test for Saponins			
a. Haemolytic test	—	—	—
b. Foam test	—	—	—
6. Test for Tannins			
a. Ferric Chloride solution	+	+	+
7.Test for Flavonoids			
a. Lead acetate test	+	+	+
b. Ferric Chloride Test	+	+	+
8. Test for Proteins			
a. Xanthoproteic test	—	—	—
b. Millon's test	—	—	—
c. Biuret test	—	—	—
d. Ninhydrin test	—	—	—

+ ve indicates positive result and –ve indicates negative result.

Table.2-Percent Protection Comparison of Ethanolic Extract of Fruits of *Coriandrum Sativum*, Leaves of *Datura Stramonium* and *Azadirachta Indica*

Treatment	Edema Volume					
	1.00 hr		3.00 hr		5.00 hr	
	(ml)	%Inhibition	(ml)	%Inhibition	(ml)	%Inhibition
Control	0.65 ±0.03	----	0.70±0.04	-----	0.69 ±0.05	-----
C.sativum (200mg/kg)	0.40± 0.05	25.66	0.42 ±0.03	40.81*	0.35± 0.04	33.78*
A.indica (200mg/kg)	0.38± 0.02	28.33	0.38 ±0.06	46.47*	0.32± 0.02	38.13*
D.stramonium (200mg/kg)	0.39± 0.03	26.74	0.43 ±0.04	39.43*	0.48± 0.02	30.43*
Standard (Diclofenac Sodium) (5mg/kg)	0.30± 0.06	55.57	0.25 ±0.03	65.00*	0.29± 0.03	58.00*

Significant at $p<0.001$, Values are expressed as ± SEM

Table. 3 Results of Acute Toxicity Studies at Different Doses of Ethanolic Extract of *Coriandrum Sativum*, *Datura Stramonium* and *Azadirachta Indica*

100mg/kg		500mg/kg		1000mg/kg		1500mg/kg	
Dead	Live	Dead	Live	Dead	Live	Dead	Live
0	10	0	10	1	9	0	10

CONCLUSION

It can be concluded that the *A. indica* at 200 mg/kg dose posses significant anti-inflammatory activity than *C. sativum and D. stramonium.* Although the protection provided by *C. sativum and D. stramonium* is less as compare to *A. indica* still both has a potential to be used as anti-inflammatory agent. These studies therefore provide a basis for further detailed investigations on therapeutic efficacy of these plants. Studies in the direction of elucidating the mechanism of anti-inflammatory activity need to be conducted.

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