SHORT COMMUNICATIONS

Analgesic and Anti-inflammatory Effects of *Hedychium spicatum*

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Alcoholic extract of rhizome of *Hedychium spicatum* was found to possess significant anti-inflammatory activity in carrageenin-induced hind paw oedema. It also produced analgesic activity in acetic acid-induced writhing movements in mice and Randall-Selitto assay in rats.

HEDYCHIUM spicatum is a perennial rhizomatous herb, grown in sub-tropical Himalayas. The rhizome has been used as stomachic, carminative and stimulant[1,2]. The root and stalk have been reported to be useful as analgesic and anti- inflammatory[3] and also in liver, urinary and respiratory disorders[5]. Alcoholic extract of the rhizome of *H. spicatum* has been demonstrated to possess anti-inflammatory and CNS depressant activities[6]. Only limited information is available about the analgesic activity of rhizome of *H. spicatum*[7]. The present communication, therefore, examines its analgesic activity in various models of pain in addition to its anti-inflammatory activity.

Air-dried and powdered rhizomes of *H. spicatum* were extracted with 95% ethanol. The extract was concentrated to a solid mass under reduced pressure. The alcoholic extract was suspended in Tween-80 and given orally to experimental rats and mice in multiple doses of 30, 100 and 300 mg/kg for different pharmacological experiments. Six animals were taken in each group.

Anti-inflammatory activity of alcoholic extract was studied in rats by injecting 0.1 ml of 1% suspension of carrageenin in normal saline below plantar aponeurosis of right hind paw[8]. Drugs were given 1 h before injection of carrageenin. Paw volume was measured before and 3 h after injection of carrageenin by a plethysmometer (Ugo-Basile, Italy). Analgesic activity of the extract was tested by hot plate test[9], acetic acid-induced (300 mg/kg, ip) writhing movements[10] and Randall-Selitto assay[11].

In acute toxicity experiments, the test substance was administered orally to six fasted mice in doses of 2.5-10 g/kg. General behaviour and mortality was observed upto 72 h after drug administration. The data were analysed by Student's 't' test and the level of significance was observed at $P<0.05$.

In carrageenin-induced hind paw oedema test, the extract (300 mg/kg) significantly reduced the oedema volume. The per cent inhibition of oedema volume was 64.2 in comparison to 23.6 observed in earlier studies[7]. The effect shown by 300 mg/kg of alcoholic extract was comparable to 300 mg/kg of acetylsalicylic acid. The anti-inflammatory effect of the plant extract could probably be due to the flavonoids reported from this plant[12]. These findings support the earlier observations[6,7].

Analgesic activity was studied by three methods. In the hot plate test method, the reaction time in control mice was 7.66 ± 1.23 sec. The extract (30,

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Table 1

The effect of *H. spicatum* on carrageenin-induced hind paw oedema, Randal Selitto assay in rats and acetic acid-induced writhing in mice

Treatment[n]	Dose (mg/kg)	Carrageenin Induced oedema ml⊕	Randal-Selitto Assay Pressure g⊕	Acetic acid-induced writhing Writhing no./20min
Control	–	0.53 ± 0.04	60.83 ± 9.80	57.33 ± 4.84
H. spicatum Ext.	30	0.54 ± 0.05	107.50 ± 24.74	47.00± 5. 58
	100	0.41 ± 0.07	103.33 ± 16.85	47.33 ± 2.78
	300	0.19± 0.06*	170.00 ± 30.07*	37.66 ± 6.09
Acetyl salicylic acid	300	0.27 ± 0.04*	123.33 ± 21.63*	17.00± 5.88*

* P <0.05; ⊕ Each value is mean ± S.E. of six determinations.

100 and 300 mg/kg) did not prolong the reaction time to thermal stimuli suggesting lack of activity of morphine type of analgesia. Acetic acid- induced writhing movements and Randall-Selitto assay methods were used to test the peripheral analgesic activity of the extract. Effect of single oral dose of alcoholic extract on yeast-induced pain threshold (Randall-Selitto assay) is summarised in Table 1. Alcoholic extract of *H. spicatum* at dose levels of 30 and 100 mg/kg did not increase pain threshold at 1 h as compared to respective control value, 60.83 ± 9.80 g. However, the extract (300 mg/kg) as well as aspirin (300 mg/kg) significantly increased the pain threshold. In control group of mice, acetic acid-induced writhing count was 57.33 ± 4.84 (Table 1). Administration of *H. spicatum* extract (300 mg/kg) and reference drug, acetylsalicylic acid (300 mg/kg) significantly inhibited the writhing movements by 34.32 and 70.35%, respectively. Thus, the extract was found to possess peripheral analgesic activity. The results of the present study confirm the anti-inflammatory and analgesic activities of the plant[6,7]. Pain, swelling and fever are the signs of inflammation for which, it has been used in the traditional system of medicine. Thus, our results support the medicinal value of the rhizome of *H. spicatum* in inflammation and inflammatory pain.

In acute toxicity experiments, graded doses of the extract (2.5- 10 g/kg) did not produce any acute toxicity and death during 72 h of observation period. Thus, mice tolerated very high doses of the extract without producing any adverse effect suggesting that the extract possessed high margin of safety. In conclusion, the present results suggest that alcoholic extract of *H. spicatum* possessed significant analgesic and anti-inflammatory activities which need detailed studies.

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Transdermal delivery of Prazosin HCL with non-ionic surfactants

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The effect of non-Ionic surfactants on the enhancement of skin permeation of prazozin HCl was studied *In vitro* using excised guinea pig skin. Among the Spans, Span 80 was found to produce the highest permeation of the drug. Among the Tweens, Tween 80 was found to produce the highest permeation of the drug. Tweens produced higher permeation than Spans. Adequate levels of transdermal permeation were observed.

PRAZOSIN HCl is a very potent and selective α_1 adrenergic receptor antagonist. Various studies have been reported on the suitability of prazosin HCl for transdermal delivery[1,2]. The present study was carried out to determine the effect of selected non-ionic surfactants on the transport of prazosin HCl across guinea pig skin *in vitro.* The concentration dependence of the surfactants on the enhancement of permeation of the drug was also determined.

Prazosin HCl (Sun Pharmaceutical Industries Ltd., Baroda), Ethylene vinyl acetate copolymer 2806 (Polyolefins Industries Ltd., Bombay), Spans 20, 40, 60, 80, Tweens 20, 40, 60 and 80 were used as received. All other chemicals used were of analytical grade.

The drug loaded and rate controlling membranes of ethylene vinyl acetate copolymer 2806 (EVA) were prepared using 'Glass substrate technique' by placing a glass plate over the mercury surface. Diethyl phthalate at 2% w/w of the polymer was used as the plasticizer. Rate controlling membranes were prepared at 50 and 100 um thickness. Drug-polymer matric was prepared by finely dispersing the drug particles in the solution of EVA. Opaque films of 100 um thick, containing 20 mg/sq. cm of prazosin HCl were prepared. The prepared films were kept in a vaccum desiccator for 24 h to remove the traces of toluene.

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