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Fitoterapia 72 (2001) 922–926

FITOTERAPIA

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Short report

Anxiolytic activity of aerial and underground parts of *Passiflora incarnata*

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Received 6 May 2001; accepted in revised form 26 May 2001

Abstract

The petroleum ether, chloroform, methanol, and water extracts of *Passiflora incarnata* whole plant and sorted out plant parts have been evaluated for their anxiolytic activity using the elevated plus-maze model in mice. The methanol extracts of leaves, stems, flowers, and whole plant exhibited anxiolytic effects at 100, 125, 200 and 300 mg/kg, respectively. The roots were practically devoid of anxiolytic effects. These results show that roots and flowers of *P. incarnata* act as natural adulterants by causing a significant increase in the anxiolytic dose. Therefore, separation of these parts is recommended prior to any pharmacological, phytochemical and standardization studies on *P. incarnata*.

Keywords: *Passiflora incarnata*; Anxiolytic activity

Plant. *Passiflora incarnata* L. (Passifloraceae) whole plants (fresh aerial and underground parts) were collected from a cultivated source (Rati Ram Nursery) at village Khurammpur via Kalsia, district Saharanpur (UP, India), in August 2000. Leaves and petioles; stems and tendrils; flowers including buds; and roots were sorted out (38, 33, 6 and 23% of the whole plant, respectively) and dried in shade. The identity of the plant was confirmed at the Museum-cum-Herbarium of the University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh, where a voucher specimen has also been deposited.

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0367-326X/01/$ - see front matter
PII: S0367-326X(01)00322-7

Uses in traditional medicine. Aerial parts have been used for sedative, anxiolytic and antispasmodic purposes [1,2]. Aqueous extract of *P. incarnata* roots has been used for topical application on ulcers and hemorrhoids [3,4]. The whole plant has also been used in insomnia, anxiety, and other CNS disorders [5–7]. The methanol extract of the aerial parts (125 mg/kg, p.o.) has been shown to possess significant anxiolytic activity [8].

Previously isolated classes of constituents. Flavonoids [9,10], glycosides [11], alkaloids [12], cyanogenic glycosides [13], carbohydrates [14], amino acids [15], benzopyrones [16], and volatile constituents [17] from the aerial parts (not elaborated). Coumarins from the roots [18].

Tested material. Petroleum ether, $CHCl_3$, MeOH, and water successive Soxhlet extracts of different parts of *P. incarnata*, viz. leaves and petioles (L), stems and tendrils (S), flowers including buds (F), roots (R), and the whole plant (Wp). Yields

Table 1
Phytochemical parameters for extracts of different plant parts of *Passiflora incarnata*[a]

Plant parts	Extract	Yields (%)	Alk	Fla	Gly	Ter	Car	Tan	Cou
L	Petrol	1.84	−	−	−	−	−	−	−
	$CHCl_3$	2.98	+	−	−	−	−	−	−
	MeOH	4.10	−	+	+	−	−	−	−
	Water	2.20	−	−	−	−	+	−	−
S	Petrol	1.72	−	−	−	−	−	−	−
	$CHCl_3$	2.90	+	−	−	−	−	−	−
	MeOH	4.75	−	+	+	−	−	−	−
	Water	2.23	−	−	−	−	+	−	−
F	Petrol	1.10	−	−	−	−	−	−	−
	$CHCl_3$	2.78	+	−	−	−	−	−	−
	MeOH	4.05	−	+	+	−	−	−	−
	Water	2.53	−	−	−	−	+	−	−
R	Petrol	1.34	−	−	−	−	−	−	−
	$CHCl_3$	3.33	+	−	−	−	−	−	−
	MeOH	4.67	−	+	+	−	−	−	−
	Water	2.44	−	−	−	−	+	−	+
Wp	Petrol	1.80	−	−	−	−	−	−	−
	$CHCl_3$	3.09	+	−	−	−	−	−	−
	MeOH	4.31	−	+	+	−	−	−	−
	Water	2.94	−	−	−	−	+	−	+

[a] L, leaves and petioles; S, stems and tendrils; F, flowers including buds; R, roots; Wp, whole plant; Alk, alkaloids; Fla, flavonoids; Gly, glycosides; Ter, terpenes; Car, carbohydrates; Tan, tannins; Cou, coumarins; −, negative test; +, positive test.

Table 2
Anxiolytic effects of extracts of *Passiflora incarnata* leaves, stems, flowers, roots, and whole plant in mice (elevated plus-maze model)[a]

Treatment (mg/kg, p.o.)	Dose	Time spent in open arms (s)				
		L	S	F	R	Wp
Control (vehicle, 0.25 ml, p.o.)	–	0	0	0	0	0
Petrol extract	75	0	0	0	0	0
	100	0	0	0	0	0
	125	0	0	2.4 ± 0.89*	0	0
	200	1.4 ± 0.55	0	2.6 ± 0.55*	0	0
	300	2.2 ± 0.45*	0	3.0 ± 0.71**	2.6 ± 0.55*	0.8 ± 0.45
$CHCl_3$ extract	75	0	0	0	0	0
	100	0	0	1.8 ± 0.45	0	0
	125	0	1.6 ± 0.55	3.8 ± 1.3***	2.2 ± 1.10*	0
	200	0	2.8 ± 0.45*	5.2 ± 1.48***	1.4 ± 0.55	1.2 ± 0.45
	300	0	3.3 ± 1.10**	4.8 ± 0.84***	0	1.8 ± 0.84
MeOH extract	75	16.2 ± 2.28***	8.8 ± 1.64***	7.2 ± 1.58***	0	4.4 ± 1.14***
	100	38.4 ± 5.13***	18.4 ± 1.82***	13.4 ± 1.52***	1.2 ± 0.45	8.2 ± 1.3***
	125	32.8 ± 4.32***	35.6 ± 3.9***	21.8 ± 3.56***	3.2 ± 1.10**	19.2 ± 2.6***
	200	11.2 ± 1.92***	24.2 ± 2.17***	36.2 ± 3.7***	2.6 ± 0.80*	28.8 ± 3.3***
	300	0	2.2 ± 0.45*	19.8 ± 3.11***	0	37.0 ± 3.5***
Water extract	75	0	0	3.2 ± 1.10**	0	0
	100	1.8 ± 0.84	0	3.8 ± 0.84***	0	0
	125	3.4 ± 0.55**	0	5.6 ± 0.92***	1.6 ± 0.55	2.4 ± 0.89*
	200	3.2 ± 0.84**	2.2 ± 0.84*	7.4 ± 1.34***	2.0 ± 0.71*	2.8 ± 0.95**
	300	3.4 ± 0.55**	3.0 ± 0.71**	7.8 ± 1.3***	4.0 ± 0.71***	3.6 ± 1.14***
Diazepam	2	←		36.8 ± 3.19***	→	

[a] L, leaves and petioles; S, stems and tendrils; F, flowers including buds; R, roots; Wp, whole plant. Values are expressed as mean ± S.D. ($n = 5$); *$P < 0.05$, ** $P < 0.01$, ***$P < 0.001$ vs. control, ANOVA followed by Fischer's LSD test. Vehicle, 1% w/w carboxymethylcellulose in Simple Syrup.

(as % on dried weight) and results of phytochemical screening tests [19] are detailed in Table 1.

Studied activity. Anxiolytic activity using modified elevated plus-maze model in mice [20,21]. Vehicle [1% w/w carboxymethylcellulose in Simple Syrup IP (66.7% w/w sucrose in water)], test extracts suspended in vehicle, and diazepam (reference) suspended in vehicle were administered orally and the behavior of animals on the elevated plus-maze was recorded for 5 min.

Animals. Swiss mice of either sex, weighing 20–24 g, procured from the Disease Free Small Animals House, College of Veterinary Sciences, Haryana Agriculture University, Hisar, India, were bred at the Central Animal House of the Panjab University, Chandigarh. The mice were allowed standard laboratory feed and water ad libitum.

Results. Reported in Table 2.

Conclusions. The ongoing challenge for standardization of plant derived medicines, points out the need to identify, select and use only those plant parts which possess the maximum therapeutic efficacy [22]. The results of the present study show that roots of *P. incarnata*, being devoid of anxiolytic effects, act as natural adulterants and should be separated from the aerial parts. The presence of flowers along with leaves and stems is also undesirable. Using the whole plant for pharmacological studies, commercial purposes and as a medicine, is an irrational selection, as far as the CNS effects of *P. incarnata* are concerned. Although the separated leaves afford the best possible results, the selection of the entire aerial parts excluding the flowers may prove to be the optimum approach for picking up the bioactive plant parts of *P. incarnata*.

Acknowledgements

The authors are grateful to the Council of Scientific & Industrial Research, New Delhi, India for awarding Senior Research Fellowship to Kamaldeep Dhawan.

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