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Research Article

Analgesic Activity of Gmelina Arborea Roxb in Colony Bred Swiss Mice and Wister Rats

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ABSTRACT
The peripheral analgesic activity of Gmelina arborea (100, 300 and 1000 mg/kg) was studied using acetic acid-induced Writhing in mice and by Randall-Selitto assay. The central analgesic of alcoholic extract of Gmelina arborea was studied using hot plate method and tail clip method. Alcoholic extract of Gmelina arborea significantly decreased the writhing movements in mice in acetic acid induced writhing test. Alcoholic extract of Gmelina arborea (1000 mg/kg) significantly increased the pain threshold capacity in rats in Randall-Selitto assay and the reaction time in hot plate test but not in tail clip test. Alcoholic extract of Gmelina arborea showed analgesic activity.

Keywords: Gmelina arborea, Randall-Selitto assay, Analgesic activity

INTRODUCTION

Gmelina arborea Roxb.,commonly known as Gambhari1 and it belongs to family Verbenaceae. Gambhari grows throughout India is moist deciduous forests like Himalaya, Nilagiri, alongwith eastern and Western Ghats. It has demulcent, stomachic, refrigerant and laxative properties. It is used as bitter tonic and in from of an infusion or decoction in fever, indigestion anasarcea and with liquorice, sugar and honey as galactogogue2. The tree attains height up to 20 meters, and the bark grayish white, exfoliating in thin flakes. The leaves are10-25 cm long, 8-20 cm broad, heart-shaped, tapering towards the apex. The paste of the leaves is applied on the forehead to alleviate the headache, especially in fever. To mitigate the burning sensation of the body, fresh juice of leaves is massaged, with great benefit. Internally, the roots and fruits of gambhari are used in excessive thirst, dysuria, sexual debility in males and habitual abortion, alleviate flatulence, augment the appetite and are salutary in piles, being mild laxative. The root has been reported to contain apiosylskimmin, cetylalcohol, gmelinol, sesqueterpenes, umbeliferone and heartwood contain arboreal, butulinol, cluytyl ferulate3,4,5, 1,4-D hydroxysesamin, gmelanone, isoareol, linoleic acid palmitic acid oleic acid stigmasterol and luteolin, quercetin, apigenin and melinosides A –L have been isolated from leaves6,4. The leaves juice, milk and sugar are recommended in inflammatory conditions of urinary bladder and dysuria. Since no information is available on analgesic activities of Gmelina arborea leaves, the present study was undertaken to investigate the analgesic activities of Gmelina arborea leaves.

MATERIALS AND METHODS

Preparations of Gmelina arborea leaf extract (GLE): The leaves of Gmelina arborea was collected from Ayurvedic garden of Forest Research Institute (FRI), Dehradun and authenticated by Dr.N.A.Siddique, Department of Pharmacy, MJP Rohilkhand University, Bareilly. The shade-dried leaves of Gmelina arborea were powdered and then extracted with 90% ethanol by heating under reflux. The ethanolic extract was concentrated under reduced pressure to a semisolid mass and was made free from solvent. For in vivo studies, the concentrated was administered orally after suspending in normal saline. The freshly prepared solution of was used in each experiment.

Experimental animals: Colony bred swiss mice and wister rats were used in the study. The animals were kept in polypropylene cages and maintained on balanced ration with free access to clean drinking water.

Analgesic activity of GLE: The peripheral analgesic activity of GLE was investigated the acetic acid induced Writhing test7 and Randall Selitto assay 8(Randall-Selitto apparatus, Ugo Basile, Italy) in mice and rats, respectively. The writhing movements were observed and counted for 20 min. after acetic acid administration. The central analgesic action of GLE was assessed by hot-plate9 and tail-clip test10 in mice. GLE was used in the doses of 100, 300 and 1000 mg/kg orally in the study. Aspirin (300 mg/kg, p.o) and pethidine (5 mg/kg. i.p.) were also used as standard drugs for comparing analgesic effects at peripheral and central levels, respectively. Six animals were used in each treatment group.

Statistical analysis: The results are presented as mean ± SEM. Statistical analysis of data was performed using Student's t test to study the differences amongst the means11.

RESULTS AND DISCUSSION

Analgesic effect of GLE: In acetic acid induced writhing test, GLE (100, 300 and 1000 mg/kg p.o.) reduced writhing

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Table1. Analgesic effect of *GLE* on Acetic-acid induced writhing in Mice and Randall-selitto assay in rats.

Drug	Dose (mg/kg)	Writhing test	Randall-Selitto assay		
		No. of writhings (per 20 min)	Pressure on paw in g		
			0 h	1 h	3 h
Control	-	51.17 ±3.25	49.17±6.12	52.37 ±6.98	55.27 ± 5.25
GLE	100	32.28 ±3.57**	52.18 ±6.54	68.28 ±7.17	71.28 ±5.57
	300	31.10 ±3.61**	54.10 ±8.87	70.10 ±11.61	68.40 ±8.61
	1000	29.33 ±3.72***	61.34 ±5.43	106.13±8.33**	71.33 ±10.70
Aspirin	300	11.68 ±2.47***	61.98 ±4.47	157.68±14.47***	88.68 ±11.01*

*n: six animals in each group; Values are mean ± SEM, *P<0.05, **P<0.01 *** P<0.001 when compared to control.*

Table2. Effect of *GLE* on thermic stimulus-induced pain (hot plate test) in mice.

Drug	Dose (mg/kg)	Reaction time in seconds at time (h)				
		Pressure on paw in g				
		0	0.5	1	2	3
Control	-	7.58 ±1.26	8.18 ±1.06	7.98 ± 0.87	11.18 ±1.02	10.57 ±1.25
SLE	100	8.28 ±1.34	6.98 ± 0.94	8.68 ± 0.91	11.72 ±1.24	10.68 ±1.21
	300	8.10 ±1.17	8.45 ±1.19	10.17 ± 1.61	12.10 ±1.04	11.40 ± 1.98
	1000	7.68 ±0.98	9.58 ±1.02	9.28 ± 0.87	15.68 ±1.47*	14.33 ±1.67*
Aspirin	300	8.88 ±1.15	10.02 ±1.15	14.88 ± 2.68*	16.41±1.42**	12.68 ±0.94

*n: six animals in each group; Values are mean + SEM, *P<0.05, **P<0.01 *** P<0.001 when compared to control.*

counts significantly (Table 1) in Randall-Selitto assay, GLE (100 and 300 mg/kg, p.o.) failed to alter pain threshold capacity but increased significantly ($p<0.01$) at the dose of 1000 mg/kg at 1 h. Aspirin, significantly increased the pain threshold throughout the observation period of 1 to 3 h (Table 1). The results action time at 2 to 3 h with 1000 mg/kg GLE, whereas reference drug pethidine hydrochloride significantly increased the reaction time at 1h and 2 h (Table 2). In tail clip test, GLE failed to alter the reaction time significantly even at the highest dose (1000 mg/kg) employed the present study. The analgesic activity of GLE was studied for central and peripheral activities .The analgesic activity of GLE against acute inflammatory pain was moderate as compared to potent inhibitory activity of aspirin. Aspirin and Indomethacin offer relief from inflammatory pain by suppressing the formation of pain substances in the peripheral tissues, where prostaglandins and bradykinins were suggested to play an important role in the pain process12. Therefore, it is likely that GLE might suppress the formation of these substances or antagonize the action of these substances and thus exerts its analgesic activity in acetic acid-induced writhing test and in Randall-Selitto assay. In the present study, GLE (1000mg/kg) significantly increased the reaction time in hot plate test, suggesting its central analgesic activity.

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