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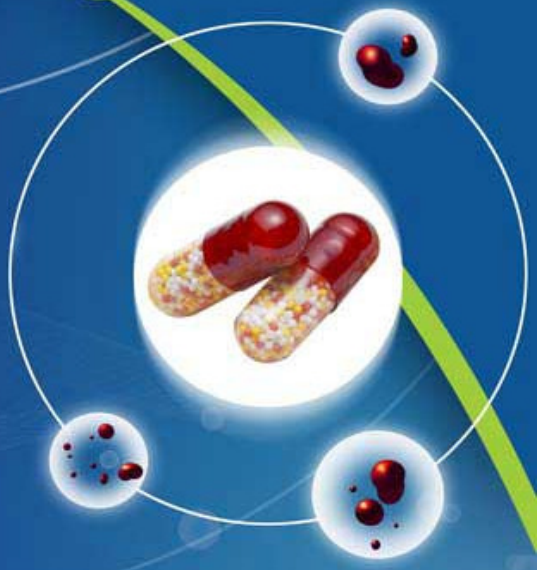

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Research Article

PHARMACOLOGICAL EVALUATION OF INFLORESCENSE OF *AERVA PSEUDOTOMENTOSA BLATT . & HALLB.*

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ABSTRACT:

World Health Organization (WHO) has defined herbal medicines as finished, labeled medicinal products that contain active ingredients, aerial or underground parts of the plant or other plant material or combinations. World Health Organization has set specific guidelines for the assessment of the safety, efficacy, and quality of herbal medicines. Aerva is a genus of plant in the family Amaranthaceae with about 167 species around Mediterranean, Asia and in the North America. The Aerva pseudotomentosa Blatt.& Hallb. is globally distributed in Pakistan and India. It is found from arid and semiarid region of Rajasthan state mainly in Jodhpur, Barmer, Bikaner, Churu, Jaiselmer, Jhunjhunu, Sikar and Shri Ganganagar districts and is commonly known as Bui, Buari. It is small, spiny, erect, undershrubs; more and less grandullar; branchess slander, terete, triate, glabrous. Leaves opposite, 1-3 foliate; petioles very variable in length, from 3 - 30 mm long, deeply striate, very slender; stipules 2 pairs of sharp slender thorns, sometimes exceeding 12 mm in length; leaflet linear, acute, and sessile or with very short petiolules. The ethanolic extract of A. Pseudotomentosa in doses of 200 and 400 mg/kg significantly suppressed carrageenan-induced paw edema in rats 70.15% and 67.08% for PE while 44.89% and 60.29% for EE while Both ethanolic and acetone extracts of the plants were found to exhibit a dose dependent increase in latency time when compared with control. At 90 minutes, the percent inhibition of two different doses (200 and 400 mg/kg body weight) was 50.00% & 65.51% for ethanolic extract and 35.14% & 56.56% for acetone extract respectively.

Key Words: *Herbal medicines, Aerva pseudotomentosa Blatt & Hallb, Paw edema, Latency time*

INTRODUCTION

Herbal medicine, sometimes referred to as botanical medicine or herbalism, involves the use of plants or parts of plants, to treat injuries or illnesses [1].

Herbal medicines are the study or use of medicinal herbs to prevent and treat diseases and ailments or to promote health and healing [2]. It is a drug or preparation made from a plant or plants and used for any of such purposes. Herbal medicines are the oldest form of health care known to mankind [3]. There are numerous herbal products available that claim to treat the symptoms of a wide range of problems, from depression to cold and flu.

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World Health Organization (WHO) has defined herbal medicines as finished, labeled medicinal products that contain active ingredients, aerial or underground parts of the plant or other plant material or combinations. World Health Organization has set specific guidelines for the assessment of the safety, efficacy, and quality of herbal medicines. WHO estimates that 80% of the world populations presently use herbal medicine for primary health care [4]. Exceptionally, in some countries herbal medicines may also contain by tradition, natural organic or inorganic active ingredients which are not of plant origin. Herbal medicine is a major component in traditional medicine and a common element in ayurvedic, homeopathic, naturopathic and other medicine systems [5]. Herbals are traditionally considered as harmless since they belong to natural sources [6]. The use of herbal medicine due to toxicity and side effects of allopathic medicines, has led to sudden increase in the number of herbal drug manufacturers. For the past few decades, herbal medicines have been increasingly consumed by the people without prescription. Seeds, leaves, stems, bark, roots, flowers, and extracts of all of these have been used in herbal medicine over the millennia of their use. Herbal formulations have reached widespread acceptability as therapeutic agents like antimicrobial, antidiabetic, antifertility, antiageing, antiarthritic, sedative, antidepressant, antianxiety, antispasmodic, analgesic, anti-inflammatory, anti-HIV, vasodilatory, hepatoprotective, treatment of cirrhosis, asthma, acne, impotence, menopause, migraine, gall stones, chronic fatigue, alzheimer's disease and memory enhancing activities [7].

Plant Profile of Aerva pseudotomentosa Blatt.&Hallb.

Synonyms: *Aerva javanica (bovei), Areva Persica*

Common name: Bui, Buari

Taxonomical Classification

Table 1: Taxonomical Classification of *Aerva pseudotomentosa* Blatt.&Hallb

Domain: *Eukaryota*	**Subclass:** *Caryophyllidae*
Kingdom: *Plantae*	**Superorder:** *Caryophyllanae*
Subkingdom: *Viridaeplantae*	**Order:** *Caryophyllales*
Phylum: *Magnoliophyta*	**Suborder:** *Chenopodiineae*
Subphylum: *Euphyllophytina*	**Family:** *Amaranthaceae*
Infraphylum: *Radiatopses*	**Genus:** *Aerva*
Class: *Magnoliopsida*	**Specific epithet:** *pseudo-tomentosa* - Blatt. & Hallb.

Habit and Habitat

It is a small much branched tree or shrub of arid regions in Africa, Middle East and southern Asia, including the Thar Desert. It bears a mass of slender, leafless branches, the small caduceus leaves being found only on young shoots. It rarely exceeds a height of 5 meters (15 feet). Flowering and fruiting occur in October to February. [8]

Botanical description

Morphological characters:

- Herbs or shrubs.
- Stem erect, stoloniferous or climbing.
- Leaves alternate or opposite, margin entire.
- Flower perfect, unisexual or dioecious, small or very small.
- Inflorescences spikes, terminal or axillary, simple or in complex thyrsoid structures.

Bracts and bracteoles membranous, persistent or bracteoles falling off with perianth in fruit. Tepals 4 or 5, ovate or oblong, membranous or papery, lanose, with only 1 vein . Stamens 4 or 5; filaments subulate, unequal, united to short cup at base, alternating with pseudostaminodes, pseudostaminodes subulate to oblong; anthers 2-loculed. Ovary obovoid or subglobose, glabrous; style persistent; stigmas 2, capitate. Utricles ovoid, compressed , membranous, indehiscent or irregularly dehiscent (bursting), falling off with perianth.

- Seeds reniform-orbicular, lenticular, compressed**.** [9]

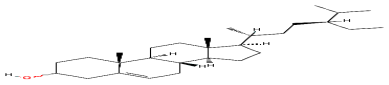
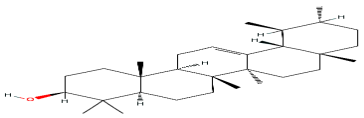
Plant parts used

Inflorescences and root

Chemical Constituents: [10]

- Palmetic acid, Beta-sitosterol and alpha-amyrin.

Table 2: Major chemical constituents present in *Aerva pseudotomentosa* Blatt.&Hallb

Name	*IUPAC Name*	*Formula*	*Structure*
Palmitic acid	Hexadecanoic acid	$C_{16}H_{32}O_2$	
Beta-sitosterol	17-(5-ethyl-6-methyl -heptan-2-yl)-10,13-dimethyl-2,3,4,7,8,9 ,11,12,14,	$C_{29}H_{50}O$	
alpha-Amyrin	4,4,6a,6b,8a,11,12,1 4b-octamethyl-2,3,4a ,5,6,7,8,9,10,11,12, 12a,14,14a -tetrade cahydro-1H-picen-3-ol	$C_{30}H_{50}O$	

Materials

S.No.	*Name of Item*	*Specification (grade, pack size)*	*Name of company (Mfd.by)*
1.	Petroleum ether	(60-80%), GR Grade, 2.5 Lt	Loba Chemie Ltd. Mumbai
2.	Benzene	99.5%, GR Grade,2.5Lt	Loba Chemie Ltd. Mumbai
3.	Ethanol	99.9%, LR Grade	Jai Chemicals and Pharma Works, Jaipur
4.	Glacial acetic acid	99.5%, LR Grade, 500 ml	Loba Chemie Ltd. Mumbai
5.	Chloroform	99.5%, LR Grade, 1Lt	Loba Chemie Ltd. Mumbai
6.	Acetone	99%, LR Grade, 1Lt	Loba Chemie Ltd. Mumbai
7.	n-Hexane	85%, LR Grade, 500ml	Loba Chemie Ltd. Mumbai
8.	n-Butanol	99%, LR Grade, 500ml	Loba Chemie Ltd. Mumbai
9.	Potassium hydroxide pellet	LR Grade, 500gm	Loba Chime Ltd. Mumbai
10.	Anisaldehyde pure	98%, LR Grade, 500ml	Loba Chemie Ltd. Mumbai
11.	Sodium hydroxide pellet	LR Grade, 500gm	Loba Chemie Ltd. Mumbai
12.	Silica gel G	LR Grade,250gm	Loba Chemie Ltd. Mumbai
13.	Sodium carboxy methyl cellulose	LR Grade, 500gm	
14.	Pentazocin inj. IP	1ml, 30mg/ml	Biochem. Pharma

Animals required

List of animals required

S.No.	**Name of animal**	*Specification(strain/type)*	*Total number of animals required*
1	Rat	Wistar Rats (either sex)	50

Acute oral toxicity Test: (Acute Toxic Class Model)

The acute oral toxicity test was carried out as per the guidelines set by Organization for Economic Co-operation and Development (OECD) revised draft guidelines 423, revised from Committee for the purpose of Control and Supervision of Experiments on Animals (CPCSEA), ministry of social justice and empowerment, Govt. of India. All the animal experiments were approved by the institutional animal ethical committee of Kota College of Pharmacy, Kota (Rajasthan).

PHARMACOLOGICAL EVALUATION OF VARIOUS PLANT EXTRACTS FOR ANALGESIC AND ANTI-INFLAMMATORY ACTIVITY

Evaluation of analgesic activity in rats using hot plate method:

Experimental animals of either sex were randomly selected and divided into four groups designated as group-I, group-II, group-III, group-IV, group-V and group-VI consisting of five rats in each group for control, positive control and test sample group respectively. Each group received a particular treatment i.e. control (1% Tween-80 solution in water, 10ml/kg, p.o.), positive control (Pentazocin lactate 10 mg/kg, IP) and the test sample (ethanolic and acetone extract of 200 mg/kg, p.o. & 400 mg/kg, p.o. respectively). The animals were positioned on Eddy's hot plate kept at a temperature of 55±0.5 0C. A cut off period of 15 s was observed to avoid damage to the paw. Reaction time was recorded when animals licked their fore or hind paws, or jumped prior to and 0, 30, 60 and 90 min after oral administration of the samples [11].

Evaluation of anti-inflammatory activity by carrageenan induced rat paw oedema:

The rats were divided into four groups containing six rats in each group. 0.1 ml of 1.0% carrageenan in normal saline (0.9% w/v NaCl) was injected to the sub plantar region of right hind paw. The META was administered to the rats 1 h before carrageenan injection. Different groups were treated as follows:

Group I: Carrageenan (0.1 ml of 1.0% carrageenan/rat to the sub plantar region)

Group II: Carrageenan + Indomethacin (10 mg/kg b. w., p. o.)

Group II and IV: Carrageenan + EE (200 mg/kg and 400 mg/kg b. w., p. o. respectively

Group V and VI: Carrageenan + AE (200 mg/kg and 400 mg/kg b. w., p. o. respectively)

The paw volume was measured initially and at 1, 2, 3, 4 and 5 h after carrageenan injection, using Plethysmograph, inflammation was calculated for comparison. The difference between the two readings was taken as the volume of edema and the percentage anti-inflammatory activity was calculated.

RESULT & DISCUSSION

The acute toxicity study was carried out on four groups of healthy adult rats (150-250 gm body weight) of either sex in the department of Pharmacology, Kota College of Pharmacy, kota (Rajasthan). It was found that all the animals were safe at a dose of 2000 mg/kg body weight and there was no abnormal behavior. Therefore, we have selected the 1/10th and 1/5th tolerated dose i.e. 200 mg/kg

body weight and 400 mg/kg body weight were selected as a therapeutic dose for analgesic and anti-inflammatory studies.

Effect of ethanolic extract of *Aerva pseudotomentosa* on latency to hot plate test in rats

Groups	*Dose (mg/kg)*	*Mean latency (s) before and after drug administration(s)*				*% inhibition of paw edema*		
		0 min	*30 min*	*60 min*	*90 min*	*30 min*	*60 min*	*90 min*
Group-I	Vehicle	2.30	2.51	2.59	2.43	-	-	-
Group-II	10	3.42	4.40	6.23	6.62	29.41	82.35	94.11
Group-III	EE 200	3.05	3.72	4.04	4.53	23.33	33.33	50.00
Group-IV	EE 400	2.90	3.42	4.36	4.81	17.24	48.27	65.51

Values for analgesic activity were expressed as "mean increase in latency after drug administration ±SEM" in terms of seconds ". The significance of difference between means was determined by student's t-test values of $p<0.05$ were considered significant and $p<0.01$ as highly significant. All statistical procedures were performed according to the method of Alcaraz

Results of hot plate test are presented for the crude extracts of *Aerva pseudotomentosa* Blatt & Hallb. Ethanolic extract of the plant was found to exhibit a dose dependent increase in latency time when compared with control. At 90 minutes, the percent inhibition of two different doses (200 and 400 mg/kg body weight) was 50.00% & 65.51% for ethanolic extract. The results were found to be statistically significant ($p<0.001$).

Effect of ethanolic extract of *Aerva pseudotomentosa* on Carrageenan induced paw oedema in albino rats

Groups	*Dose (mg/kg)*	*Mean Paw volume measured before and after drug administration(s) by mercury Plethysmometer(ml)*					*% inhibition*
		0 hr	**1 hr**	**2 hr**	**3 hr**	**4 hr**	
Group-I	Vehicle	0.30	0.72	0.85	1.06	1.82	-
Group-II	10	0.20	0.45	0.36	0.28	0.24	83.33
Group-III	EE 200	0.36	0.67	0.96	0.86	0.75	47.36
Group-IV	EE 400	0.32	0.37	0.69	0.74	0.59	54.23

Values for anti-inflammatory activity were expressed as "mean increase in paw volume ±SEM". The significance of difference between means was determined by student's t-test values of $p<0.05$ were considered significant and $p<0.01$ as highly significant. All statistical procedures were performed according to the method of Alcaraz. The results of in the carragennan induced paw oedema in rats, the ethanolic extract of *A. pseudotomentosa* in doses of 200 and 400 mg/kg, *p.o.* produced dose-dependent response

to decrease the paw volume 47.89% and 54.29% respectively after 4 hrs administration of doses. The test and the standard drugs produced significant inhibition of paw edema as compared to the control.

SUMMARY & CONCLUSION

Aerva is a genus of plant in the family *Amaranthaceae* with about 167 species around Mediterranean, Asia and in the North America. The *Aerva pseudotomentosa* Blatt.& Hallb. is globally distributed in Pakistan and India. It is found from arid and semiarid region of Rajasthan state mainly in Jodhpur, Barmer, Bikaner, Churu, Jaiselmer, Jhunjhunu, Sikar and Shri Ganganagar districts and is commonly known as Bui, Buari. It is small, spiny, erect, undershrubs; more and less grandullar; branchess slander, terete, triate, glabrous. Leaves opposite, 1-3 foliate; petioles very variable in length, from 3 - 30 mm long, deeply striate, very slender; stipules 2 pairs of sharp slender thorns, sometimes exceeding 12 mm in length; leaflet linear, acute, and sessile or with very short petiolules. [12]

Traditionally, the whole plant extract is widely used by various tribal communities, forest dwellers and in desert region for the treatment of variety of ailments such as in gastric complaints, in pain relief, in rhrumatism and various venereal diseases. As pharmacological use of point *Aerva pseudotomentosa* Blatt.&Hallb. has been used as anti-inflammatory, as analgesic, as anthelmintic and tonic, etc. Preliminary phytochemical analysis revealed the presence of alkaloids and flavonoids in all extracts, carbohydrates in ethanol extract, phenolic compounds in acetone and ethanol extracts, tannins and saponins in acetone extract, phytosterole and fixed oil in benzene and in Pet. Ether extract and triterpenoids in benzene, chloroform and ethanol extract while glycoside, volatile oil, gums and mucilages were absent in all extracts.

The Pharmacological study suggest that the ethanolic extract of *A. Pseudotomentosa* in doses of 200 and 400 mg/kg significantly suppressed carrageenan-induced paw edema in rats 70.15% and 67.08% for PE while 44.89% and 60.29% for EE while Both ethanolic and acetone extracts of the plants were found to exhibit a dose dependent increase in latency time when compared with control. At 90 minutes, the percent inhibition of two different doses (200 and 400 mg/kg body weight) was 50.00% & 65.51% for ethanolic extract and 35.14% & 56.56% for acetone extract respectively.

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