

RESEARCH ARTICLE

**Anti-Arthritic Activity of *Abutilon hirtum***

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**ABSTRACT**

The present study evaluates the anti-arthritic activity of methanolic extract from *Abutilon hirtum* in male albino rats. The evaluation of anti-arthritic activity was carried out using cotton pellet granuloma method and Freund's adjuvant induced arthritis model. Methotrexate (0.75 mg/kg bw) was used as a standard drug. The methanolic extract of *Abutilon hirtum* exhibited significant anti-arthritic activity as compared to other extracts. The doses of 200 mg/kg bw of the methanolic extract of *Abutilon hirtum*, in chronic model of granuloma pouch in rats produced 51.0% and in arthritis model produced 46.0 % inhibition respectively with that of the standard drug methotrexate (0.75 mg/kg) which produced 59% and 61% inhibition.

**Key words:** *Abutilon hirtum*, Anti-arthritic, cotton pellet granuloma, Freund's adjuvant.

**INTRODUCTION**

*Abutilon hirtum* (Family Malvaceae) commonly known as Indian mallow is perennial herb or shrub, pubescent leaves 4-14 cm across, ovate to orbicular, irregular and minute to coarsely serrate or crenate. Usually cordate at base, obtuse to acute or shortly acuminate at apex pubescent on both sides. Many branched erect, stout and aromatic herb about 1.0 –1.5 m tall. *Abutilon hirtum* (Malvaceae) is found throughout tropical and sub tropical regions of India. This is small herb found throughout India also in melghat forest. The various parts of plant claimed to have several traditional medicinal properties, it also give scientific evidences to the folklore claim on the anti-arthritic activity. The whole plant is studied for anti inflammatory, immuno stimulating effect, piles, gonorrhoea and hepatoprotective treatment. Root and bark are used as anti diabetic, nervine tonic, and diuretic. Seeds are used as aphrodisiac, in treatment of urinary disorders. The plant is reported to have analgesic, hypoglycemic, hyperlipidemic activity. The present study is an attempt to validate anti-arthritic activity of *Abutilon hirtum*. Through literature review, it is clear that this widely mentioned claim of this plant i.e. its use in arthritis has not been adequately explored. Hence, it is worthwhile to investigate aerial parts of *Abutilon hirtum* for these activities to add scientific data to the current

knowledge of medical plants have been found to possess several phytochemical active compounds.

**MATERIALS AND METHODS**

**Plant Materials**

The Plant material (whole plant) was collected from the melghat forests of Amravati district in Maharashtra, India in the month of November and was authenticated at official agencies. The fresh aerial parts were washed under tap water to remove adhered dirt and external foreign material, followed by rinsing with distilled water, shade dried and pulverized in a mechanical grinder to obtain coarse fine powder.

**Preparation of Extracts**

The coarse powder of aerial parts was extracted with methanol using Soxhlet apparatus. The solvent was removed under reduced pressure, which gave a greenish black colored sticky residue. A portion of dried methanolic extract (ME) was suspended in water and fractionated successively with petroleum ether (PE), diethyl ether (DE) and ethyl acetate (EA). All the fractions were dried by distillation under reduced pressure. Standard methods (Trease and Evans, 1989; Harborne, 1994) were used for preliminary photochemical screening of the methanolic extract (ME) and its fractions to know the nature of

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phytoconstituents present in it.

### Animals

Albino rats of either sex (Wistar strain) weighing about 120-160 g were selected for the present research work, animals were divided into groups of six each. Test drug was freshly prepared as a fine homogenized suspension in tween-80 (2% w/v). Methotrexate (0.75 mg/kg bw) was used as a standard drug. All the animals were approved by the ethics committee of the institute.

### Cotton Pellet Granuloma in Rats

Pre-sterilized cotton pellets  $50 \pm 1$  mg was implanted subcutaneously by incision on the back under ether anaesthesia. Drugs were administered

orally. Animals were killed on day 7 and the granuloma was dissected out, dried in an oven at  $60^\circ\text{C}$  and weighed to determine the percent inhibition of granuloma (**Table 1**).

**Table 1: Effect of various extracts of *Abutilon hirtum* in Cotton pellet granuloma model**

Treatment	Cotton pellet granuloma	
	Weight of granuloma (mg)	Percent inhibition
Control tween-80 (2%)	187.17 $\pm$ 1.10	-
Methotrexate (0.75 mg/kg)	76.27 $\pm$ 1.50#	59
PE extract (200 mg/kg)	104.48 $\pm$ 2.16#	44
DE extract(200 mg/kg)	114.34 $\pm$ 2.65#	39
EA extract(200 mg/kg)	118.68 $\pm$ 2.06#	36
ME extract(200 mg/kg)	91.86 $\pm$ 1.11#	50

N=6 animals per group. Values are mean $\pm$ SEM. #P<0.05 (as compared to control)

**Table 2: Effect of various extracts of *Abutilon hirtum* Adjuvant induced arthritis model.**

Treatment	Adjuvant induced arthritis		
	Edema volume (ml)		
	After 3 days	After 21 days	Percent inhibition after 21 days
Control tween-80 (2%)	0.46 $\pm$ 0.02	0.37 $\pm$ 0.02	-
Methotrexate (0.75mg/kg)	0.42 $\pm$ 0.02#	0.20 $\pm$ 0.01#	61
PE extract(200 mg/kg)	0.46 $\pm$ 0.03	0.26 $\pm$ 0.02#	39
DE extract (200 mg/kg)	0.46 $\pm$ 0.02	0.27 $\pm$ 0.02	36
EA extract (200 mg/kg)	0.46 $\pm$ 0.03	0.30 $\pm$ 0.03	28
ME extract (200 mg/kg)	0.44 $\pm$ 0.02	0.24 $\pm$ 0.03#	45

N=6 animals per group. Values are mean $\pm$ SEM. #P<0.05 (as compared to control)

### Adjuvant Induced Arthritis in Rats

Arthritis was induced in rats in groups of six animals by injecting 0.05 ml of 0.5% (w/v) suspension of killed *Mycobacterium tuberculosis* in paraffin oil by intradermal injection into the left hind paw. Paw volume was measured till the 12th day by using Plethysmometer (Model 7140). Drug treatment was started on day 13 and terminated on day 21. The difference in paw volume on day 13 and day 21 were considered as oedema volume. The percent inhibition of oedema was determined. The details of drug dosage for the granuloma and arthritis experiments are given in (**Table 2**).

### Data Analysis

Data are expressed as a mean $\pm$ SEM. Statistical analysis was performed by one-way ANOVA followed by Dunnet's test. P values <0.05 were considered as significant.

### RESULTS AND DISCUSSION

The LD50 values of all the extracts were found to be more than 2000 mg/kg. All the extracts of *Abutilon hirtum* showed potent antiarthritic activity and the potency of the extracts follows the order standard > ME > PE > DE > EA. The results of cotton pellet granuloma model as well as adjuvant induced arthritis model indicate that among all the extracts, the methanolic extract

shows more potent activity. In chronic cotton pellet granuloma model, oral administration of 200 mg/kg of the methanolic extract produced 50% inhibition of granuloma as compared to standard Methotrexate (0.75mg/kg) which produced 59% inhibition of granuloma. Oral administration of 200 mg/kg of methanolic extract inhibited Freund's adjuvant induced rat paw oedema by 45% after 21 days.

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