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RESEARCH ARTICLE

INVESTIGATION OF *IN-VITRO* ANTI-ARTHRITIC ACTIVITY OF *ABUTILON MUTICUM*

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ABSTRACT

The various extracts of *Abutilon muticum* were investigated for its anti-arthritic activity 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. Prednisolone (5 mg/kg bw) was used as a standard drug. The methanolic extract of *Abutilon muticum* exhibited significant anti-arthritic activity as compared to other extracts. The doses of 200 mg/kg bw of the methanolic extract of *Abutilon muticum*, 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 Prednisolone (5 mg/kg) which produced 59% and 61% inhibition.

KEYWORDS: *Abutilon muticum,* Anti-arthritic, cotton pellet granuloma, Freund's adjuvant.

INTRODUCTION:

Abutilon muticum (Family Malvaeae) is perennial herb or shrub, stellate pubescent leaves 2-16 cm across, ovate to orbicular, irregular and minute to coarsely serrate or subentire or crenate. Usually cordate at base, obtuse to acute or shortly acuminate at apex pubscent on both sides, scabrous above hairy and velvety beneath. Many branched erect, stout and aromatic herb about 0.5 – 2 m tall. *Abutilon muticum* (Malvaceae) is found throughout tropical and sub tropical regions of India this is commonly known as Karandi, Balbij in hindi. This is small herb found throughout India and grows on waste and barren land along road sides. The various parts of plant claimed to have several traditional medicinal properties. The whole plant is studied for anti inflammatory, immuno stimulating effect, piles and gonorrhea treatment. Root and bark are used as aphrodisiac, anti diabetic, nervine tonic, and diuretic. Seeds are used as aphrodisiac, in treatment of urinary disorders. The plant is reported to have analgesic, hypoglycemic, hepatoprotective, hyperlipidemic activity. Also reported in the literature isolation of sesquiterpine lactone, isolation of Gallic acid, eugenol wound healing and anti bacterial activity. The present study is an attempt to validate anti-arthritic activity of *Abutilon muticum.*

In succession to a thorough literature review, it is clear that the two widely mentioned claims of this plant i.e. its use in arthritis and antistress has not been adequately explored. Hence, it is worthwhile to investigate aerial parts of *Abutilon muticum* for these activities to add scientific data to the current knowledge Medical plants have been found to posses several phytochemical active compounds which possess wide range of biological activities that are responsible for the observed curative effects of herbal medicines.

MATERIALS AND METHODS:

PLANT MATERIALS:

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

PREPARATION OF EXTRACTS:

The aerial parts were extracted with methanol using Soxhlet apparatus. The solvent was removed under reduced pressure, which gave a greenish black coloured 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 phytoconstituents present in it.

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ANIMALS:

Experiments were performed on albino rats of either sex (Wistar strain) weighing about 120-160 g, divided into groups of six each. Test drug was freshly prepared as a fine homogenized suspension in tween-80 (2%w/v). Indomethacin (10 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:

Autoclaved cotton pellets 50±1 mg was implanted subcutaneously by incision on the back under ether anaesthesia. Drugs were administered orally for 7 days. Animals were killed on day 7 and the granuloma was dissected out, dried in an oven at 60°C and weighed to determine the percent inhibition of granuloma (Table 1).

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

Treatment	Cotton pellet granuloma	
	Weight of granuloma (mg)	Percent inhibition
Control tween-80 (2%)	192.15±1.11	-
Prednisolone (5 mg/kg)	81.26±1.55#	59
PE extract (200 mg/kg)	109.47±2.16#	44
DE extract(200 mg/kg)	119.33±2.85#	40
EA extract(200 mg/kg)	123.67±2.10#	37
ME extract(200 mg/kg)	96.85±1.15#	51

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

Table 2: Effect of various extracts of *Abutilon muticum* 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%)	0.42±0.02	0.33±0.02	-
Prednisolone (5mg/kg)	0.38±0.02#	0.16±0.01#	61
PE extract(200 mg/kg)	0.42±0.03	0.22±0.02#	39
DE extract (200 mg/kg)	0.42±0.02	0.23±0.02	36
EA extract (200 mg/kg)	0.42±0.03	0.26±0.03	28
ME extract (200 mg/kg)	0.40±0.02	0.20±0.03#	46

N=6 animals per group. Values are mean±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 Plethismometer (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±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 muticum 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 51% inhibition of granuloma as compared to standard Prednisolone (5mg/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 46% after 21 days where as Prednisolone (5 mg/kg) inhibited rat paw oedema by 61% after 21 days.

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