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Evaluation of Analgesic Activity of Different Leaf Extracts of C*elastrus paniculatus* (willd.)

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ABSTRACT

Celastrus paniculatus Willd. (Celastraceae), commonly known as Staff tree in English, is a woody climber grown in tropics and subtropics and also cultivated commercially in India for the high demand of its seed oil. The present study assessed the different solvent extracts of *C. paniculatus* leaf for the evaluation of their analgesic potential by acetic acid induced writhing assay in Swiss albino mice. All of test extracts exhibited significant analgesic activity. The methanol extract was found to be the most potent followed by the ethyl acetate and petroleum ether extracts respectively. The present preliminary study demonstrates marked analgesic activity of *C. paniculatus* leaf.

Keyword: Analgesic activity, *Celastrus paniculatus*, Writhing, Leaf

INTRODUCTION:

Jyotisamati (*Celastrus paniculatus*), a plant of vedic lore is a woody climber. It is a large, woody scrambling or climbing Polygamodioecious type of shrub, which with assistance from a nearby tree climbs up to over 10 m. It occurs almost throughout India ascending to an altitude of 1800 m in the subtropical Himalayas. The seed oil and fruit is commonly practiced for its tranquillizing, sedative, wound healing etc. activity. *C. paniculatus* is one of such classical drugs which is being used by the tribals for different conditions. The bark is abortifacient, depurative and a brain tonic. The leaves are emmenagogue and the leaf sap is a good antidote for opium poisoning. The seeds are acrid, bitter, thermogenic, emollient, stimulant, intellect promoting, digestive, laxative, emetic, expectorant, appetizer, aphrodisiac, cardiotonic, anti-inflammatory, diuretic, diaphoretic, febrifuge and tonic, abdominal disorders, leprosy, skin diseases, paralysis, asthma, leucoderma, cardiac debility, inflammation, nephropathy, amenorrhoea,

dysmenorrhoea. The leaves contains alkaloids, a glycoside and colouring matter, whereas the oil extracted from seeds contain sterols, alkaloids and a bright colouring matter, Celapanin, Celapanigin, Celapagin, Celastrine and paniculatine are the some important alkaloids present in the seeds (1). The oil also contains sesquiterpene like dipalmitoyl glycerol and alkaloids also. Folklore experience is that Malkangni leaf has good analgesic activity (2). However, the analgesic assessment of petroleum ether, ethyl acetate and methanol extract from *C. paniculatus* leaf are still not reported. Therefore, in the present investigation we attempted the study on the leaf extracts of *C. paniculatus* grown in India.

MATERIAL AND METHODS:

Plant material: The mature leaves of *Celastrus paniculatus* (Celastraceae), were collected during November 2011 from Jamnagar, Gujarat, India. The plant material was taxonomically identified at the Central National Herbarium, Botanical Survey of India, Howrah, West Bengal, India. The voucher specimen (CNS/107/2011/Tech. II) was maintained in our research laboratory for future reference. The plant material was shade-dried with occasional shifting and then powdered with mechanical grinder, passing through sieve no. 40, and stored in an air-tight container.

Preparation of plant extracts: The dried powdered material (23.2 g) was defatted with petroleum ether (60-80°C) by Soxhlet extractor and the percentage extractive value was 4.74 % w/w. The defatted powder material thus obtained was further extracted with ethyl acetate and methanol for 72 h in a percolator. The solvent was distilled off in reduced pressure and resulting semisolid mass was vacuum dried using rotary flash evaporator to yield a solid residue and the percentage extractive values were accordingly 7.75 % w/w and 9.91 % w/w respectively. The preliminary phytochemical analysis was performed for all three extracts to identify the phytoconstituents present in the extracts (3).

Chemicals: Acetyl salicylic acid (aspirin) and glacial acetic acid from Sigma Chemical Co. Ltd. (St. Louis, MO, USA). All other chemicals and reagents were of analytical grade obtained commercially.

Experimental animals: Adult male albino mice of Swiss strain weighing 20 ± 2 g were procured from registered breeders and maintained under standard laboratory conditions (temperature 25 ± 2°C with dark and light circle 14/10 h). They were allowed

free access to standard dry pellet diet (Hindustan Lever, Kolkata, India) and water *ad libitum*. The mice were acclimatized to laboratory condition for 10 days before commencement of the experiment.

Evaluation of Analgesic activity: Acetic acid-induced writhing test: Swiss albino mice were divided into five groups (n = 6). Group I received acetic acid (1% v/v, 10 ml/kg b.w., i.p.) and writhing reflex was noted for the period of 15 minutes. Group II received aspirin (100 mg/kg b.w. p.o.) Group III, IV and V received the petroleum ether, ethyl acetate and methanol extracts at the doses of 200 mg/kg b.w., p.o. respectively. 30 min after aspirin and extracts administration, group II to V received acetic acid (1% v/v, 10 ml/kg b.w., i.p.) and writhing reflex was noted for the period of 15 min (4). The mean writhing scores in each group were calculated and expressed the percentage of protection using the following formula:-

(Control mean - Treated mean/ Control mean) ×100 %.

Statistical analysis: The data are represented as mean ± standard error of mean (SEM). Degree of significance was assessed by Student's '*t*' test.

RESULTS AND DISCUSSION:

Preliminary phytochemical studies showed the presence of steroids, terpenoid and fixed oil both in the petroleum ether extract and ethyl acetate extract also; and steroids, terpenoids, glycosides, phenolic compounds, tannins, carbohydrates, saponins in the methanol extract.

The analgesic efficacy of *C. paniculatus* leaf extracts was evaluated by acetic acid induced writhing method in mice to assess peripheral (non-narcotic) type of analgesic activity (5,6). Acetic acid induced writhing is chemically induced nociception by intraperitonial injection of dilute acetic acid solution to mice. The chemical agents can produce nociceptive reactions in mice. Intra-peritoneal injection of phenyl para quinone, bradykinin or dilute acetic acid (1-3% v/v) produces pain reaction that is characterized as writhing response. Constriction of abdomen, turning of trunk (twist) and extension of hind limbs (at least one) are considered as writhing reaction to chemically induced pain (6-8).

Table: 1: Analgesic effect of *C. paniculatus* leaf extracts on acetic-acid induced writhing in mice.

Treatment	**Dose**	**Number of writhes**	**% Protection**
I. Acetic acid (1% v/v)	10 ml/kg	52.83 ±1.400	-
II. Acetic acid + Aspirin	100 mg/kg	17.66 ±1.606*	66.57
III. Acetic acid + Pet. ether extract	200 mg/kg	23.89 ±1.281*	54.77
IV. Acetic acid + Ethyl acetate extract	200 mg/kg	20.55±1.361*	61.10
V. Acetic acid + Methanol extract	200 mg/kg	16.69±1.451*	68.41

Values are mean ± SEM (n = 6). *p < 0.001 when compared to control

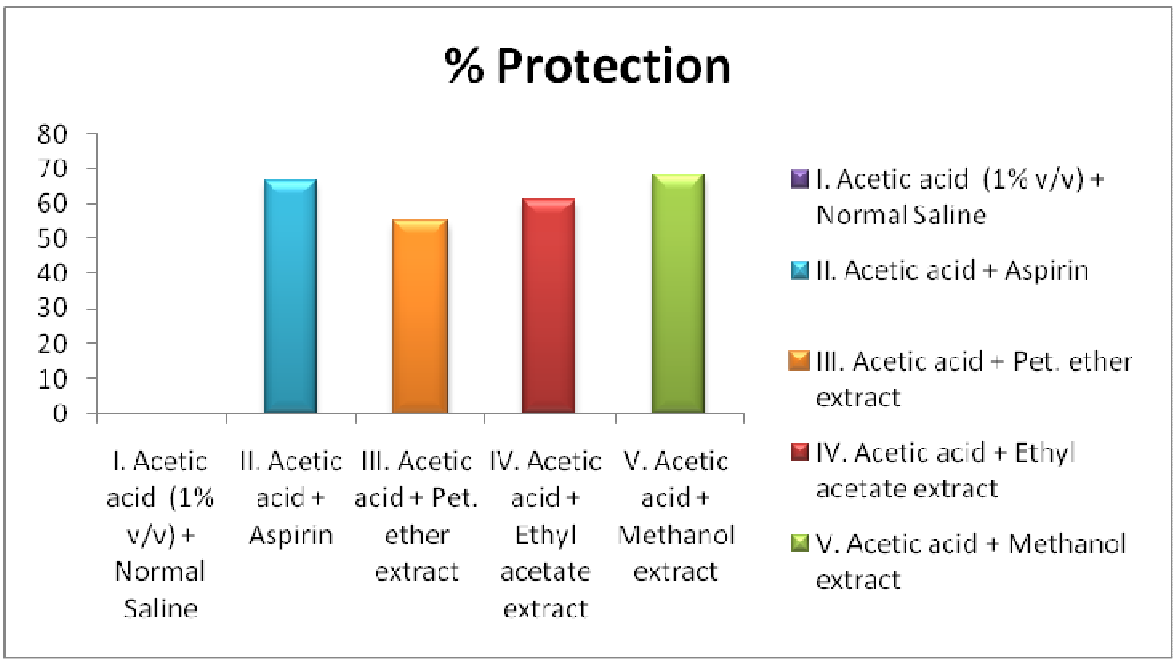

Fig: 1: Percentage of protection by different leaf extracts with respect to standard drug Aspirin.

Acetic acid induced writhing test is known as a visceral pain model nociception. Several mediators like kinins, acetylcholine, substance P, calcitonin-gene-related peptide and prostaglandins (PG) take part in visceral pain model nocicepotion and transmission of

the nociception from the viscera. In this test both central and peripheral analgesics are detected. Analgesics of both narcotic (central) e. g. morphine, pentazocin, pethidine and non-narcotic (peripheral) type, e. g. aspirin, ibuprofen, indomethacin can inhibit the writhing response in mice (9-12).

Based on the results obtained from the present study, it can be inferred that all the test extracts had effective peripheral analgesic actions. The methanol extract was found to be the most potent followed by the ethyl acetate and petroleum ether extracts respectively (Table 1). The present preliminary study confirms marked analgesic activity of *C. paniculatus* leaf which may be due to presence of multitude of chemical constituents present in the plant extracts.

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