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Original Research Article

ANALGESIC ACTIVITY OF LEAVES, FLOWERS AND FRUIT PEEL OF *LUFFA CYLINDRICA* (L.) ROEM

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ABSTRACT

Ethanol extracts of leaves, male flowers and fruit peel of *Luffa cylindrica* (L.) Roem., were evaluated for analgesic effect using analgesy meter test, a mechanically induced pain model. Extracts at the dose of 500 mg/kg, p.o., were tested and compared with diclofenac sodium 50mg/kg as standard analgesic drug. Mechanical force was applied on the rat paw and continuously increased. The point at which rat can't bear further pressure and starts struggle to free paw was taken as nociceptive response. Readings were taken before and after 1, 2 and 3hr following drug administration. Analgesic response was continuously increasing till 3hrs. Tested extracts produced significant and comparable analgesic effect as with diclofenac sodium.

Key words: *Luffa cylindrica*, analgesic activity, analgesy meter test, mechanically induced pain.

INTRODUCTION

Luffa cylindrica (L.) Roem., (family Cucurbitaceae) is an annual climbing or trailing herb which is cultivated in Pakistan at Jehlum, Jammu and Kashmir, Loralai and Karachi. The plant is reported as laxative and useful in asthma, intestinal worms, sinusitis, edema, pharyngitis and rhinitis. Leaves are used in amenorrhea, decayed teeth, parasitic affections, skin diseases, chronic bronchitis and reported as an emmenagogue and diuretic. Crushed leaves are used in various states of pain and inflammation as in carbuncles, abscesses, swellings and heat rashes of children in summer. Seeds of *Luffa cylindrica* are cathartic. The stem is used in respiratory complaints. Ripped fruits are antiseptic, anthelmintic, carminative, emmenagogue, galactagogue, used in the treatment of hemorrhage from bowels or bladder, hernia, hemorrhoids, jaundice, menorrhagia, scarlet fever, bronchitis , haematuria , leprosy , spleenopathy , syphilis and acts as tonic to the genital organs. Flowers are used for treating migraine. Chemical constituents isolated from plant are flavonoids, saponins, steroids, phenolic compounds and triterpenes. Leaves contain flavonoids, saponins and triterpenes, whereas flowers contain flavonoids. The fruit contains ascorbic acid, anthocyanins, flavonoids, triterpenoid saponins. Phenolics and carotenoids, flavonoids and oleanolic acid are reported from peel. Seed contains polypeptides. Whole plant of *Luffa cylindrica* reported to possess anti-inflammatory, anti-tussive, anti-asthmatic, cardiac stimulant, hepatoprotective, hypolipidemic whereas fruits, leaves and stem extracts possess immune-stimulant activity. Seeds reported to possess anti-inflammatory activity[1]. Leaves, male flowers[2] and fruit peel[1] possess anti-emetic and anti-inflammatory activity.

The analgesic activity of *Luffa cylindrica* fruits has already reported by using acetic acid induced writhing method and tail immersion method[3]. The presented paper is further extension of study by evaluating leaves, male flowers and fruit peel extracts.

MATERIALS AND METHODS

Collection of Plant material and identification

The leaves, male flowers and fruits were collected from Malir, Karachi in June 2012 and compared with already deposited voucher specimen (G.H.No.85993) in the herbarium of Department of Botany, University of Karachi.

Preparation of the plant extracts: Plant materials were soaked in ethanol separately for a week. All the extracts were filtered and concentrated to dryness in vacuum at 40°C by rotary evaporator.

Animals : Wistar albino rats (150-200g) of both sexes were obtained from Animal house of Aga Khan University, Karachi, Pakistan. Animals were randomly divided into groups of six animals each and

transferred into different cages with their identification mark. All tested extracts were used at doses of 500, mg/kg b.w., orally (p.o.). Group No. I represented 0.9% saline, p.o., at a dose of 10 ml/kg b.w., as control. Group II represented Diclofenac sodium (50mg/kg p.o.) as standard analgesic drug. Group III, IV and V, showed ethanol extract of leaves, flowers and peel respectively. The animals were maintained under standard laboratory conditions (temperature 25±2°C) and fed with standard pellet diet and fresh water *ad libitum*. All the animals were acclimatized to laboratory condition for a week before commencement of experiment. Permission and approval for animal studies were obtained from Board of Advanced Studies and Research, University of Karachi [BASR.Res.No.5(4)-2007].

Chemicals used

DMSO, Tween 80 and ethanol were purchased from Merck, Darmstadt, Germany. Diclofenac sodium was purchased from Sigma-Aldrich Corporation.

ANALGESIC ACTIVITY

Analgesic activity was determined by using Analgesy meter test[4]. The group of rats was treated orally with normal saline, *Luffa cylindrica* (L.) Roem., leaves, flowers and fruit peel extracts (500mg/kg each) and standard (diclofenac sodium 50mg/kg). The left hind paw of rat was placed on a plinth under a cone-shaped pusher of the Ugo Basile analgesy meter No. 7200. It generates a linearly increasing mechanical force or pressure on hind paw. As the applied pressure increases, it gets to a point where the animal struggles to free its paw. The strength at which each rat withdrew its paw was recorded and considered as indicative of pain (Figure.1). The reaction strength of each rat was determined before and at 1, 2 and 3hrs after treatment with standard drug or plant extracts. Stimulus was terminated and force threshold read in grams taken as soon as nociceptive response was elicited by the rats. Inhibition of pain (%) or pain threshold was calculated as follows:

Pain threshold= (Treated mean – Control mean/ Control mean) x 100

STATISTICAL ANALYSIS

Analgesic effect was expressed as mean ± standard error of mean. The statistical significance of the difference was determined by an unpaired Student's *t*-test.

RESULTS

Table.1.Analgesic activity of *Luffa cylindrica* leaves, flowers and fruit peel extracts

Groups	Pain threshold ± S.E.M (% inhibition of pain)				% inhibition average
	Before Drug Administration (F_O)	After Drug Administration (F_T)			
		1 hr	2 hr	3 hr	
Control	29±1.7	30±2.3	40±2.7	35±2.3	-------
DS 50 mg/kg p.o.,	63±2.0	81±2.7 (62.96)	102±2.3** (60.78)	70±3.2 (50.00)	57.91
LE 500 mg/kg p.o.,	71.5± 3.31	78±2.10 (61.53)	103±1.20** (61.16)	119±3.30 (70.58)	64.42
FE 500 mg/kg p.o.,	66±9.27	80±3.62 (62.50)	88±0.81** (54.54)	96±3.30 (63.54)	60.19
PE 500 mg/kg p.o.,	72± 2.5	106±1.9* (71.69)	111±2.0 (63.96)	126±4.2 (72.22)	69.29

DS =Diclofenac sodium, LE= Ethanol extract of leaves, FE= Ethanol extract of flowers, PE=Ethanol extract of fruit peel ; p.o. = per oral, F_O = Force at which the rat struggles to free paw before drug / extract administration; F_T =force at which the rat struggles to free paw after drug / extract administration

Values are mean ± SEM, N=6 for each group, *P< 0.05 &* P< 0.005 Vs. Control showing significant and most significant values using unpaired Student's t-test.

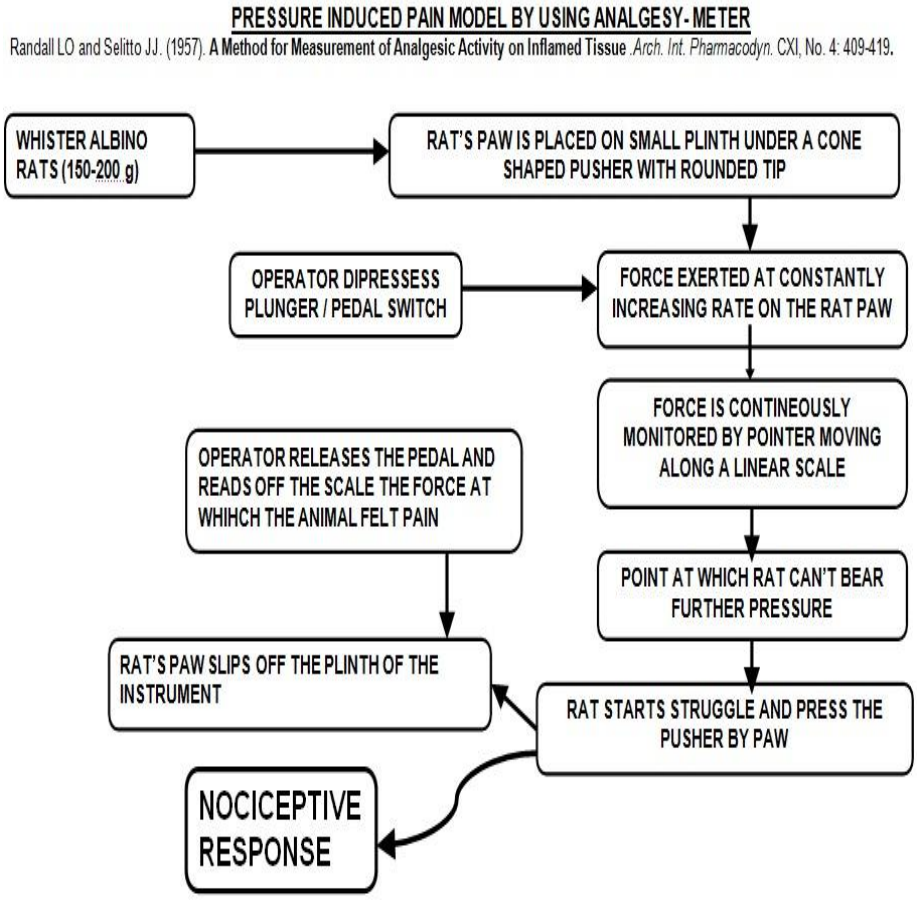

Fig.1.The methodology of analgesio meter / paw pressure test

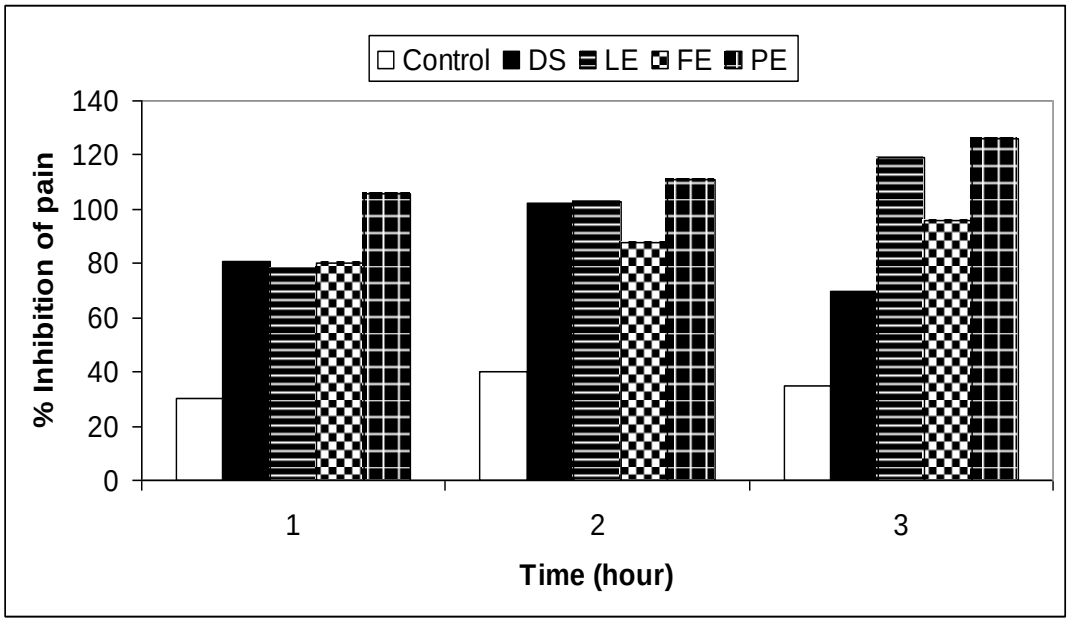

Fig.2. Analgesic activity of *Luffa cylindrica* leaves, flowers and fruit peel extracts.

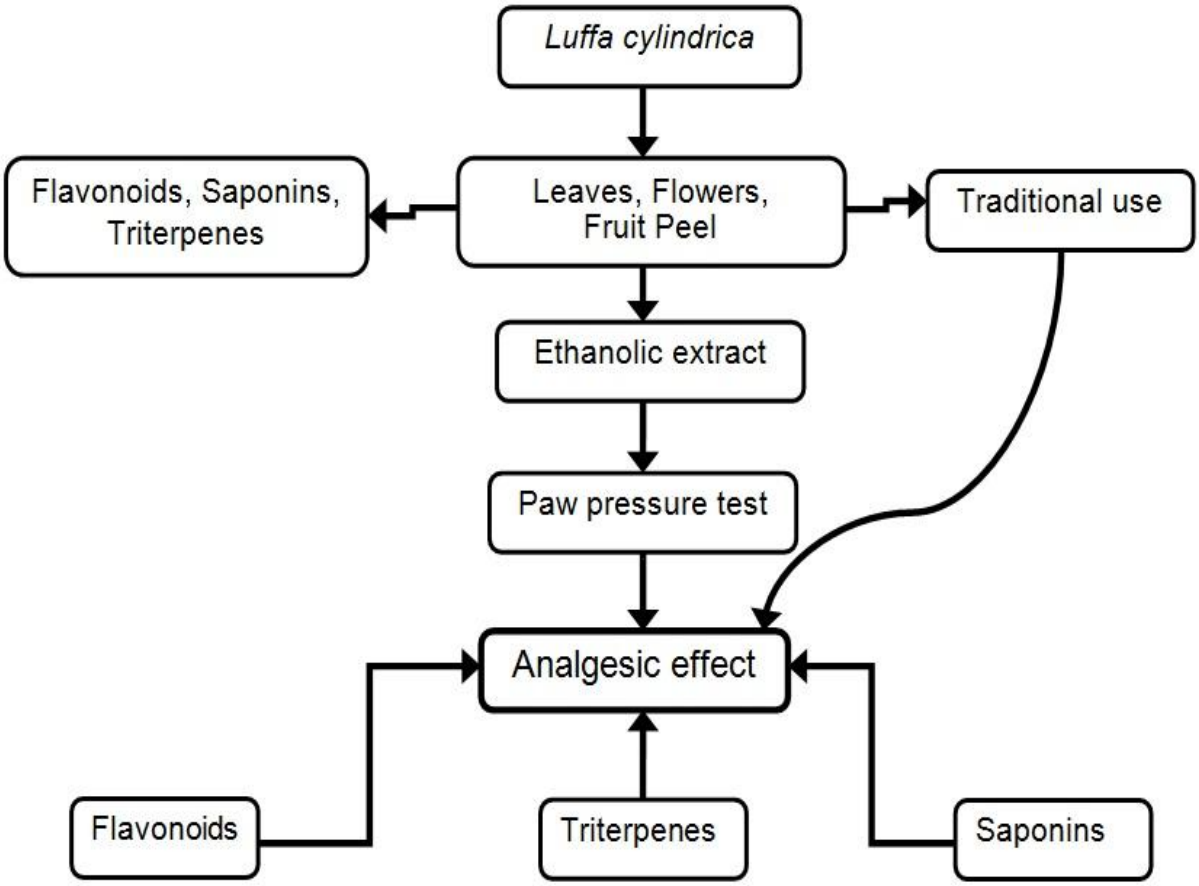

Fig.3.Proposed mechanism for analgesic activity of *Luffa cylindrica* leaves, flowers and fruit peel extracts

DISCUSSION

The oral administration of *Luffa cylindrica* (L.) Roem., leaves, flower and peel extracts (500mg/kg each) showed significant analgesic effect against mechanical pain (Table).The analgesy meter test is a useful method in elucidating centrally mediated analgesic responses. The crude extract increased nociceptive threshold of rat further strengthening the evidence of centrally mediated anti-nociceptive activity[5]. The ethanol extracts of *Luffa cylindrica* (L.) Roem., leaves, flower and fruit peel at the dose 500 mg/kg, p.o., significantly reduced the animal sensitivity to pain induced by pressure. The % average inhibition from pain was found to be 57.91 of diclofenac sodium and 64.42, 60.19, 69.29 of leaves, flower and fruit peel

respectively (Figure.2). Therefore, analgesic effects of leaves, flower and fruit peel extracts were comparable to diclofenac sodium. In this model of pain, all extracts significantly increased the ability of animals to withstand pressure-induced pain indicating a more central acting mechanism.

Phytochemical investigation of *Luffa cylindrica* reveals that leaves contain flavonoids[6], saponins[7,8] and triterpenes[9], while flowers contain flavonoids[6]. The ethanol extract of *Luffa cylindrica* peel contain the highest level of total flavonoids[10]. Flavonoids, saponins[11] and triterpenes[12, 13, 14] are reported to possess analgesic properties. Therefore, it may be said that flavonoids, saponins and triterpenes may play some role in analgesic effects of these extracts. *Luffa cylindrica* (L.) Roem., is used traditionally to relief from algesic conditions. More research is required to isolate actual responsible analgesic compound(s) from these extracts. Furthermore, other animal models are required to justify the proposed analgesic mechanism(s).

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