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Evaluation of anti-inflammatory, analgesic and antipyretic activity of *Moringa concanensis Nimmo*

M. Jayabharathi and M. Chitra

Department of Biochemistry, S.T.E.T. Women's College, Mannargudi, Thiruvarur District, Tamil Nadu

ABSTRACT

The ethanolic extract of the flowers of Moringa concanensis (family:Moringaceae) was tested for phytochemicals, anti-inflammatory, analgesic and antipyretic activity. Qualitative phytochemical analysis of Moringa concanensis flower extract was carried out with a view of developing leads for new therapeutic products. The results indicate that Moringa concanensis is rich in phytoconstituents and the studies also indicate that the ethanolic extract showed significant anti-inflammatory, analgesic and antipyretic activity when compared with standard drug.

Key words : *Moringa concanensis* flower, anti-inflammatory, analgesic, antipyretic activity.

INTRODUCTION

Medicinal plants occupied an important position in the socio-cultural, spiritual and medicinal arena of rural people of India. The Indian system of medicines i.e., Ayurveda, Siddha, unani and Homeopathic system predominantly use plant- based raw materials in most of their preparations and formulations[1]. According to an estimate of World Health Organization, nearly 80% of the populations of developing countries rely on traditional medicine [2]

Moringa concanensis Nimmo is belonging to family Moringaceae. The plant is distributed in Ooty, Yercaud area of the salem district in Tamil Nadu, and it is the second species occurring in India. *Moringa concanensis* is restricted in its distribution. The medicinally useful parts for drug preparation, mode of administration and various disease cured by this plant was discussed by Anbazhakan *et al.*, [3]. The ethanolic extract of the leaves of *Moringa concanensis* was tested for

antimicrobial activity against *E.coli, Staphylococus aureus, Salmonella typhi, Klebsiella pneumoniae and Pseudomonas aerugenosa* [4] Stem bark is abortifacient and fruits are used for curing liver and spleen diseases, joint pains and paralysis. Gum is used for treating dental problems. Flowers are used as aphrodisiac. Root and root bark is useful for the treatment of paralysis, abscess, epilepsy, rheumatism, fainting and giddiness [5]. Hydroalcoholic extract of *Moringa concanensis* showed significant antiimplantation and abortifacient activity [6]. In the present study evaluation of the anti-inflammatory, analgesic and antipyretic activity of flowers of *Moringa concanensis,* was investigated.

EXPERIMENTAL SECTION

Plant material

The flowers of *M.concanensis* were collected from Ooty. It was authenticated by the botanist in S.T.E.T women's college, Mannargudi.

Preparation of extract

The powered material (100g) of flowers of *M.concanensis* were extracted with 500ml of ethanol 95% by continuous hot percolation respectively using Soxhlet apparatus until the extraction were completed. After the completion of the extraction, the extracts were filtered and the solvents were removed by the distillation under reduced pressure. Greenish black colored residue was obtained. The extract was subjected to phytochemical screening.

Animals

Albino rats of either sex (200-250g) maintained under standard environment conditions and fed with standard pellet diet and water adlibitum, were used for the present study.

Maintenance and treatment of animals was done in accordance with the principles of Institutional Animal Ethical Committee constituted as per the directions of the committee for the purpose of Control and Supervision of Experiments on Animals (No.265/CPCSEA).

Antiinflammatory Activity

The ethanol extract was evaluated for its anti-inflammatory activity by carrageenan-induced rat paw edema model [7]. The animals were divided into three groups of six animals each. The first group served as vehicle control (saline 0.5ml/kg) and the second group received 200mg/kg body weight of *Moringa concanensis* extract. The third group served as positive control and received indomethacin 10mg/kg body weight. The drugs were given orally. After one hour, a sub plantar injection of 0.1ml of 1% carrageenan was administered in the right hind paw to all the three groups. The paw volume was measured plethysmographically at 0min, 60 min, 120 min and 180 min. The average paw of swelling in a group of extract treated rats was compared with control group (treated with vehicle) and the positive control (indomethacin).

Analgesic Activity

The thermal noxious stimulus was produced in the rats by placing them on the hot-plate maintained at 55^0c and the reaction time was recorded. Reaction time was taken as the period between placing the rats on the hot-plate and time when they licked their paws. A cut-off time of 30 sec was used to prevent any thermal injury to rats [8] and [9].

Antipyretic Activity

Albino rat weighing 200-250g were injected subcutaneously aqueous suspension of dried Brewer's yeast (12% 1ml/100g body weight).Rats developing 1^0c or more rise in rectal temperature 18h after injection were treated with 5% gum acacia P.O and served as control. Group II received plant extract (200mg/kg), Group III served as positive control and received paracetamol (25mg/kg) which is a standard drug. Temperature was recorded at time intervals of 1, 2, 3 and 4 hrs[10].

Statistical analysis

Data were expressed as mean ± S.E. of six values and analysed by student't' test for differences among controls and treated groups. The values of $P < 0.001$ and $P<0.01$ were considered statistically significant [11].

RESULTS

Preliminary phytochemical screening of ethanolic extract of *M.concanensis* revealed the presence of alkaloids, flavonoids, carbohydrate, phytosterols, fixed oils and fats. *M.concanensis* at the dose of 200 mg/kg exhibit significant anti-inflammatory activity in carrageenan induced hind paw edema model (Tabel-1). The *M.concanensis* showed significant analgesic and antipyretic activity and the results were shown in Tabel 2 and table 3.

Table – 1: Anti inflammatory activity of *M.concanensis* against carrageenan induced paw edema in albino rats

Groups	% increase in paw volume				% inhibition in paw volume
	Post insult time of assay in minutes				
	0	60	120	180	
Group I	30.91± 1.53	72.22± 2.80	95.54± 4.24	108.62 ± 4.06	--
Group II	29.74±1.80	52.34±2.8	78.4±3.20	58.22*±2.8	46.40
Group III	28.46±0.84	34.2±1.62	38.8±1.80	48.8*±2.2	55.27

** P < 0.001 Vs Control*

Values are expressed as Mean± S.E., n=6 by students 't' test

Table – 2: Analgesic effect of *M.concanensis* by Hot plate method

Groups	Reaction time in Sec.				
	0	30	60	120	180
Group I	4.4 ± 0.93	4.6 ± 0.38	4.9 ± 0.83	4.1 ± 0.52	4.4 ± 0.38
Group II	4.4 ± 0.37	6.3 ± 0.28	7.6 ± 0.36	8.2 ± 0.47*	9.0 ± 0.28*
Group III	4.0 ± 0.46	8.8 ± 0.82	9.1 ± 0.67	10.0 ± 0.43*	10.0 ± 0.32*

** P < 0.01 Vs Control*

Values are expressed as Mean± S.E., n=6 by students't' test

DISCUSSION

Carrageenan induced paw edema was taken as prototype of exudation phase of inflammation where development of edema being described as biphasic. The initial phase which occurs between 0 and 2h after injection of carrageenan, has been attributed to release of histamine,

serotonin and bradykinins.Inflammation volume reaches its maximum approximately 3h post treatment after which it begins to decline [12]. A more second phase is related to release of prostaglandin like substances [13]. The knowledge of these mediators involved in different phases is important for interpreting mode of drug action [14]

Table – 3: Anti Pyretic Activity of Plant Extract against Brewer's Yeast Induced Pyrexia In Albino Rats

Groups	Normal Tm	Temperature 18 hrs after yeast induced pyrexia	Temperature after treatment with extract(C ^{0})			
			1h	2h	3h	4h
Group I	35.23 ± 0.13	38.76±0.14	37.70±0.08	37.68±0.12	37.72±0.15	37.54±0.09
Group II	35.25±0.08	38.72±0.42	37.72±0.16	37.04±0.24	36.92*±0.18	36.53*±0.18
Group III	35.32±0.18	38.02±0.16	37.81±0.15	37.02±0.18	36.02±0.20	35.48±0.06

**P< 0.01 Vs Control*

Values are expressed as Mean± S.E., n=6 by students't' test

Peripheral inflammation involves an increase in cyclooxygenase-2-(cox -2) mediated prostaglandin (PG) synthesis in the central nervous system (CNS), which contributes to allodynia and hyperaglesia[15]. Prostaglandin D_2 is the major metabolite of the cyclooxygenase pathway in mast cells; along with prostaglandin E_2 and prostaglandin $F_{2\alpha}$ it causes vasodilation and increases the permeability of postcapillary venules, thus potentiating edema formation.

The carrageenan induced paw edema model in rats is known to be sensitive to cyclooxygenase inhibitors [16]. Based on this report it was concluded that the inhibitory effect of *Moringa concanensis* on carrageenan induced inflammation in rats could be due to inhibition of the enzyme cyclooxygenase leading to inhibition of prostaglandin synthesis.

Flavonoids are known to target prostaglandin which is involved in the late phase of inflammation[17]. Hence the presence of flavonoids in ethanol extraxct, they might suppress the formation of prostaglandins and bradykinins or antagonize their action and exerts its activity.

Prostaglandins have two major actions: they are mediators of inflammation and they also sensitise nerve endings, lowering their threshold of response to stimuli, mechanical and chemical, allowing the other mediators of inflammation, e.g. histamine, serotonin, bradykinin, to intensify the activation of the sensory endings [18].

Ethanolic extract of *Moringa concanensis* may prevents the synthesis of prostaglandin is likely to be effective in relieving pain. The extract possesses analgesic and anti-inflammatory properties which are probably mediated via inhibition of prostaglandin synthesis as well as central inhibitory mechanism.

Usually most anti-inflammatory and analgesic drugs possess antipyretic activity. In general, non-steroidal anti-inflammatory drugs produce their antipyretic action through the inhibition of prostaglandin synthetase within the hypothalamus [19]. Therefore, the antipyretic activity of ethanol extract of *Moringa concanensis* is probably by inhibition of prostaglandin synthesis in hypothalamus. The antipyretic potentials of alkaloids and flavonoids have been reported in

various studies [20]. Therefore, the antipyretic activities of the ethanol extracts may due to the presence of alkaloids and flavonoids.

From the study, it was proved that ethanolic extract of *Moringa concanensis* flowers which are enriched with flavonoids are good source to eradicate pain, fever and inflammation. Further studies are required to evaluate the usefulness of plant extract in the therapy of inflammation, fever and pain with its clear mechanism of action.

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