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Antinociceptive Effect of *Nyctanthes arbor-tristis* Linn. Leaves on Sciatica Pain Induced by Chronic Constriction Injury

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ABSTRACT

Nyctanthes arbor-tristis Linn. Commonly known as Harsingar(English:Night Jasmine), is a well documented plant. The decoction of the leaves of *Nyctanthes arbor-tristis* Linn. is widely used in Ayurvedic System of medicine for treatment of arthritis, fevers, various painful conditions and as a laxative. In present study was designed to evaluate the use of *Nyctanthes arbor-tristis* in sciatica pain. Swaras from the leaves of *Nyctanthes arbor-tristis* at the dose (10ml/kg, orally) significantly attenuated hyperalgesia (Hot-plate test) when compared with sham control measured on day 7,9,11,13,15,17 after chronic constriction injury.

Keywords: *Nyctanthes arbor-tristis,* Chronic Constriction Injury, Sciatica Pain, Swaras

1. INTRODUCTION

Sciatic neuralgia is defined as 'pain in the distribution of the sciatic nerve due to pathology of the nerve itself'. Low back pain is a common problem that will affect approximately two thirds of the adult population. It is the second leading reason for ambulatory care in the United States and direct medical costs are estimated at the over $20 billion year[1].

This disease is of concern as it affects the quality of life and is usually treated with non-steroidal anti-inflammatory drugs (NSAID), which mainly act by blocking prostaglandin synthesis. Moreover, none of the medications assessed in randomized controlled studies are effective in sciatica pain. NSAIDS are less than ideal as most of the NSAIDs are known to causes the gastric irritation, gastrointestinal ulceration reduces renal blood flow, platelet dysfunction, exacerbates asthma, allergic reactions and skin rashes. Sciatica pain requires chronic drug treatment and NSAIDs are not recommended for long-term administration. Globally currently there is greater interest in non-synthetic, natural drugs derived from plant/herbal sources due to better tolerance and decreased adverse drug reactions. In India, the medicine plants and herbal therapy is practiced long before recorded history. However, scientific knowledge concerning the use of medicinal plant in sciatica pain is very limited.

Nyctanthes arbor-tristis Linn. (oleaceae) commonly known as Harsingar and Night Jasmine. The leaves of *N .arbor-tristis* has been reported to possess anti-inflammatory activity, analgesic, anti-pyretic and ulcerogenic potency have also been reported[2,3]. In ayurvedic system of medicine *Nyctanthes arbot tristis* is widely used for the treatment of sciatica pain, but it has not yet been screened scientifically. The present study is carried out swaras of *Nyctanthes arbor-tristis* leaves on sciatic nerve ligated rats (Chronic constriction injury model).

2. MATERIALS AND METHODS

2.1 Identification and Collection of plant material

The plant material was collected from university campus of Sagar after authenticated by Department of Botany, Dr. H.S Gour University (Voucher no. Bot/Her/2912) was deposited in the same department. The fresh leaves of *Nyctanthesarbor-tristis* collected, shade dried and coarsely powdered.

2.2 Animals

Male albino rats of wistar strain weighing 150-200 gm, maintained under standard environment conditions (Temp.27°C± 2°C, relative humidity 60±5% and light-dark cycle of 12h) and given free access to food and drinking water. They were used as per the guidelines of the Institutional Animals Ethics Committee of Dr. H.S. Gour University, Sagar (M.P.) India.

2.3 Preparation of Swaras

Swaras was prepared by dry leaf powder of *Nyctanthes arbor-tristis* leaves (25gm) was added to 250 ml of boiling distilled water and boiled for 15 min. The mixture was taken in 4 layered muslin cloth and squeezed to take out the juice and concentrated at vacuum at 40°C [7].

2.4 Chronic constriction injury model

Chronic constriction injury (CCI) was produced according to Bennett and Xie. Anesthesia was induced in Albino-wistar rats by i.p injection of ketamine (60-90mg/kg) and Xilazine (4-8mg/kg). The sciatic nerve of right hind paw was located and four loose ligatures tied around the nerve using chromic catgut (4-0: sutures) at 1 mm spacing. The incision was then sutured layer to layer using silk threads. In another group of rats, the right sciatic nerve was exposed but not ligated and considered as sham-control[8].

2.5 Experimental protocol

Animals were divided in three groups. Each experimental group was comprised of six animals. After producing chronic constriction injury (CCI), standard and all drug samples were administrated to the animals. The Group I serve as sham control and received 2% gum acacia in water orally. Group II received Pethidine (at 5mg/kg). The animals of Group III were administrated swaras (at 10ml/kg, b.wt. orally). All drug samples and standard were given to animals from the day of injury to till day 17th of injury daily. The behavioral tests were conducted on day 7th, 9th, 11th, 13th, 15th and 17th.

2.6 Antinociceptive study

2.6.1 Hot- Plate Test (Thermal Paw withdrawal latency test)

Hot-plate was used to measure the paw withdrawal latency (PWL). The temperature of metal surface was maintained at 55±0.2ºC. Latency to a comfort reaction (licking paws or jumping) was determined. The cut-off time was 20sec. The latency was recorded on 7th, 9th, 11th, 13th, 15^{t}, 17th days. The obtained average latency for each group in these days was converted to percent of maximal possible effect (%MPE)[9].

2.6.2 Motor- coordination test

Motor coordination was evaluated by a Rota-Rod device as described by Jones and Robert[11]. Rats were placed for 2 min on the rotating rod, the time taken for falling from the roller, was recorded. The motor performance was recorded on 7th, 12th and on 15th days

3. RESULTS AND DISCUSSION

3.1 Antinociceptive Effect of *N. arbor-tristis*

Administration of swaras of *N.arbor-tristis* significantly attenuated hyperalgesia induced by sciatic nerve ligation. The rats treated with the swaras at the dose of 10ml/kg significantly effect hyperalgesia when compared to sham control. The rats treated with the swaras at the dose of 10ml/kg significantly attenuated hyperalgesia (Hot-plate test) measured on day 7,9,11,13,15 and17 after chronic constriction injury. The thermal paw latency was converted into %MPE [9] (Table 1 and Table 2).

3.2 Effect of *N.arbor-tristis* on motor co-ordination test

Administration of swaras of *N.arbor-tristis* significantly attenuated sciatic nerve root ligation-induced decrease in motor performance as assessed by time spent on rota rod in a dose dependent manner. The rats treated with the swaras at the dose of 10ml/kg significantly effect on motor performance when compared to sham control (Table 3).

Table 1: Observation of Thermal Paw Withdrawal latency test of *N. arbor- tristis* leaves

Thermal Paw Withdrawal latency in second						
Group	Day 7th	Day 9th	Day 11th	Day 13th	Day 15th	Day 17th
Control	7.50 ±0.22	7.50 ±0.22	7.66 ±0.21	7.50 ±0.22	7.50 ±0.22	7.33 ±0.21
Standard pethidine	9.50 ±0.22	10.16 ±0.30	11.66 ±0.33*	13.00 ±0.25*	14.16 ±0.30**	15.50 ±0.42**
Swaras	8.50 ±0.22	9.66 ±0.33*	10.83 ±0.30*	12.16 ±0.30*	13.83 ±0.30**	15.33 ±0.21**

Values are expressed as mean ± S.E.M. *P<0.05, **P<0. 01 compared to control.
Swaras = 10ml/kg, b.wt. orally
Standard=Pethidine (5mg/kg)

Table 2: Observations of Percent of Maximum Possible Effect (%MPE) of *N. arbor-tristis* leaves

Percent of maximum possible effect						
Group	Day 7th	Day 9th	Day 11th	Day 13th	Day 15th	Day 17th
Standard pethidine	16.00	21.28	32.41	44.00	53.28	64.44
Swaras	8.00	17.28	25.68	37.28	50.64	63.14

Table 3: Observation in Motor Function Test

Control	140±0.49	147±0.42	149±0.60
Standard (Pethidine)	21.83±0.49	42.83±0.60*	63.33±0.40*
Swaras	12.66±0.33	34.16±0.47*	49.66±0.04**

Values are expressed as mean ± S.E.M
*P<0.05,
**P<0. 01 compared to control

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