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Pharmacological Study

Analgesic activity of *Nelsonia canescens* (Lam.) Spreng.root in albino rats

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Abstract

Present study was undertaken to evaluate analgesic activity of root of *Nelsonia canescens* (Lam.) Spreng, a folklore medicinal plant used as the one of the source plant of *Rasna*. Study was carried out at two dose levels (270 mg/kg and 540 mg/kg) in albino rats. Analgesic activity was evaluated in formalin induced paw licking, and tail flick methods whereas indomethacin and pentazocine were used as standard analgesic drugs, respectively. At both the dose levels, test drug non-significantly decreased paw licking response at both time intervals. In tail flick model, the administration of the test drug increased pain threshold response in a dose dependent manner. In therapeutically equivalent dose level, analgesic activity was observed only after 180 min while in TED ×2 treated group analgesia was observed at 30 min and lasted even up to 240 min. The results suggested that *N.canescens* root possess moderate analgesic activity.

Key words: Analgesic, folklore, gandhamardana hills, *Nelsonia canescens*, *Rasna*

Introduction

Over three-quarters of the world population relies mainly on plants and plant extracts for health care. More than 30% of the entire plant species, at one time or other was used for medicinal purposes. Traditional systems of medicine continue to be widely practiced on many accounts. Population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several allopathic drugs, and development of resistance to certain currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments.

Nelsonia canescens (Lam.) Spreng., is one of the medicinal plants growing abundantly in various parts of India. Traditionally the root of this plant is used by traditional healers of Gandhamardan hills of Orissa in the local name of *Badarasna* (*Rasna*) for the management of pain and inflammatory conditions such as arthritis, cutting wound, and bone fractures.[1] In spite of its reputation in treating these ailments, till date no pharmacological work to support these claims has been reported hence the present study was under taken to evaluate the analgesic activities of *N.canescens* (Lam.) Spreng. root in albino rats.

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Materials and Methods

Plant material

Fresh and matured plant of *N.canescens* (Lam.) Spreng. was collected in December from its natural habitat of Gandhamardana hill ranges, Balangir, Orissa after spot identification with the help of traditional healers. Thus collected material was authenticated by pharmacognosist of the institute. The voucher specimen (Phm no. 6002/11) was deposited in pharmacognosy laboratory for future references. The roots were made into pieces, and shade dried for 12 days and then pulverized to a fine powder (mesh no. 120) and stored in an airtight container for experimental purposes.

Animals

Wistar strain albino rats of either sex weighing 180 ± 20 g were obtained from the animal house attached to the Pharmacology Laboratory, I.P.G.T. and R.A., Gujarat Ayurved University, Jamnagar. The animals were maintained on "Amrut" brand animal pellet feed of Pranav Agro Industries and tap water was given *ad-libitum*. The temperature and humidity were kept at optimum level and animals were exposed to natural day night cycles. The experiments were carried out in conformity with the guidelines

of the Institutional Animal Ethics Committee after obtaining its permission (IAEC/08-11/04-M. Sc) and care of animals was taken as per the Committee for the Purpose of Control and Supervision on Experiments on Animals (CPCSEA) guidelines.

Dose fixation

The dose fixation for the experimental animals was done on the basis of body surface area ratio by referring to the standard table of Paget and Barnes.[2] The adult human dose (3 g/day) was converted to animal dose. On this basis, the rat dose was found to be 270 mg/kg. The study was carried out at two dose levels, viz., 270 mg/kg (therapeutically equivalent dose [TED]) and 540 mg/kg (TED × 2). The test drug was suspended in distilled water by making uniform suspension with 0.5% Carboxy Methyl Cellulose (CMC) with suitable concentration depending upon body weight of animals and administered orally with the help of gastric catheter sleeved to syringe. The drugs were administered to overnight fasted animals.

Analgesic activity

Formaldehyde induced paw licking in rats

The Wister strain albino rats of either sex were weighed and randomly divided into four groups of six each. First group received distilled water and served as a control group. The second and third groups received test drugs at TED and TED ×2, respectively. Indomethacin (10 mg/kg orally - Cipla) was used as standard analgesic drug. Pain was induced by injecting 0.1 ml of 3% formalin in distilled water in subplantar region of the right hind paw, and the duration of paw licking as an index of nociception was counted in periods of 0-10 min and 20-30 min.[3]

Tail flick test

Rats were placed on the tail flick unit so that constant heat intensity was applied to the lower third of the animal's tail. When the animal flicked its tail in response to the noxious stimulus both the heat source and timer were stopped. A cut-off time of 10 s was set to avoid tail damage. Thus, basal reaction time of each rat to radiant heat was recorded, and those having tail flick latency (TFL) less than 10 s were selected. First group of animals received similar volume of vehicle as test drug and served as normal control. Rats in group two and three were treated with TED and TED ×2 of test drug respectively. To the group four, standard analgesic drug - Pentazocineof (Ranbaxy Laboratories) was administered at a dose of 20 mg/kg i.p. The vehicle, test drug, and reference standard were administered to the respective groups 1 h prior to the experiment. The TFL was recorded at 30, 60, 120, 180, and 240 min.[4]

Statistical analysis

Results were presented as mean ± SEM. Student's *t* test as well as one-way analysis of variance were used for analyzing the data generated during the study with the level of significance set at $P < 0.05$.

Results

N.canescens root at both the dose levels non-significantly decreased paw licking response at both time intervals. Treatment with RS also apparently decreased paw licking response at both time intervals; however, only the decrease observed in paw licking response at 20-30 min is found to be statistically significant [Table 1].

Administration of the test drug increased pain threshold response in a dose dependent manner [Table 2]. In TED level analgesic activity was observed only after 180 min, while in TED ×2 treated group, an apparent elevation in the latency of tail-flick response was observed at 30 min and lasted up to 240 min. In pentazocine treated group also similar prolongation of tail-flick latency was observed at all-time intervals. However, the observed prolongation in both test drugs and pentazocine treated groups were found to be statistically non-significant.

Discussion

When formalin is injected subcutaneously in to the paw, it produces intense pain reaction. The effect is seen in two phases. The initial phase lasts for 0-10 min of formaldehyde injection, it is supposed to be mediated through modulation of neuropeptides.[5] The second phase, which is observed 20-30 min of formaldehyde injection, is supposed to be mediated through release of inflammatory mediators like prostaglandin. Test drug at both dose levels non-significantly decreased the paw licking episodes at both the phases while indomethacin, which is a non-selective cyclooxygenase inhibitor significantly decreased paw licking episodes of the second phase.

Tail flick model, which is thermal induced nociception indicates narcotic involvement which is sensitive to opioid

Table 1: Effect of *Nelsonia canescens* on formalin induced paw licking response

Groups	Number of paw lickings			
	0-10 min	% Inhibition	20-30 min	% Inhibition
Control	14.17±2.65	-	14.67±2.03	-
TED	12.17±2.34	14.12↓	13.17±1.76	10.23↓
TED ×2	13.17±1.74	7.06 ↓	10.83±0.65	25.80↓
Indomethacin	09.33±0.71	34.14↓	07.33±0.75**	50.02↓

Data: Mean±SEM, ↓: Decrease, **P<0.01, TED: Therapeutically equivalent dose

Table 2: Effect of *Nelsonia canescens* on tail flick response

Treatment	TFL after drug administration (section)					
	Initial	30 min	60 min	120 min	180 min	240 min
Control	1.91±0.15	2.01±0.16	2.19±0.18	2.43±0.23	1.99±0.28	2.00±0.16
TED	1.47±0.09	1.88±0.14	2.17±0.20	2.30±0.27	2.19±0.25	2.17±0.30
TED ×2	1.63±0.23	2.26±0.33	2.35±0.34	2.83±0.45	2.55±0.44	2.69±0.63
Pentazocine	2.10±0.20	8.50±2.09	3.80±0.79	2.83±0.30	2.66±0.33	2.33±0.33

TED: Therapeutically equivalent dose, TFL: Tail flick latency, Data: Mean±SEM

μ receptors.[6] In TED level analgesic activity was observed only after 180 min while in TED ×2 treated group analgesia was observed at 30 min and lasted up to 240 min, this shows prolonged analgesic effect of the test drug. Presence of analgesic activity in this model indicates that the mechanism of action is central. The mechanism through which this effect is brought about may be due to modulation of opioid receptors or by release of endogenous analgesic factors such as encephalin and endorphin.

Conclusion

From the present study, it can be concluded that roots of N. *canescens* have mild to moderate analgesic activity especially at higher dose. Hence, it can be preferred in the treatment of pain and inflammation.

References

1. Saxena HO, Brhamam M. The Flora of Orissa. Vol. 3. Bhubaneshwar: Orissa Forest Development Corporation Ltd.; 1994. p. 1375.
2. Paget GE, Barnes JM. Evaluation of drug activities. In: Lawrence DR, Bacharach AL, editors. Pharmacometrics. Vol. 1. New York: Academic Press; 1964. p. 161.
3. Hunskaar S, Hole K. The formalin test in mice: Dissociation between inflammatory and non-inflammatory pain. Pain 1987;30:103-14.
4. Witkin LB, Heubner CF, Galdi F, O'keefe E, Spitaletta P, Plummer AJ. Pharmacology of 2-amino-indane hydrochloride (Su-8629): A potent non-narcotic analgesic. J Pharmacol Exp Ther 1961;133:400-8.
5. Fernando TR, Ratnasooriya WD, Deraniyagala SA. Antinociceptive activity of aqueous leaf extract of *Tetracera sarmentosa* L. in rats. Pharmacogn Mag 2009;1:381-6.
6. Abbott FV, Young SN. Effect of 5-hydroxytryptamine precursors on morphine analgesia in the formalin test. Pharmacol Biochem Behav 1988;31:855-60.

हन्दी सारांश

नेलसोनिया केनेससेन्स के वेदनाहर प्रभाव का प्रायोगिक मूल्यांकन

बिहज़ाद मोहादेशी, रविन्द्र द्विवेदी, अशोक बी. के., हेतल अधेरा, रबिनारायण आचार्य, शुक्ला वी. जे.

नेलसोनिया केनेससेन्स भारत के कई भागों में पायी जाने वाली वनस्पति है । गंधमर्दन पर्वतीय प्रदेश के बालंगीर जिले के पारंपरिक वैद्य इस औषधि का अस्थिभंग, संधिवात, और शूल एवं शोथ में उपयोग करते हैं, किन्तु इस क्रिया का अब तक वैज्ञानिक पद्धति से अध्ययन नहीं किया गया, इस लिए नेलसोनिया केनेससेन्स का फार्माकोलोजीकल अध्ययन किया गया और इस अध्ययन में चूहों पर औषधि का वेदना शामक प्रभाव पाया गया ।