Advances in Biological Research 7 (1): 01-03, 2013
ISSN 1992-0067

DOI: 10.5829/idosi.abr.2013.7.1.66202

Locomotor Activity of Methanolic Extract of *Saraca indica* Bark

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Abstract: The present study was undertaken to investigate the effects of *Saraca indica* on the CNS in rats. The methanolic extract of *Saraca indica* bark was evaluated for locomotor activity using actophotometer. Four groups named control, standard and two test groups were used and each group contained 6 rats. Dosing was performed using oral route. The dose of Diazepam was 2mg/kg and dose of methanolic extract was 200 and 400 mg/Kg. The doses of 200 and 400 mg/Kg significantly depicted a marked reduction in the locomotor activity of rats. The methanolic extract was found to possess significant locomotors activity in rat models and it may be due to GABAergic inhibition in the CNS via membrane hyperpolarization which leads to a decrease in the firing rate of cortical neurons in the brain or may be due to direct activation of GABA receptor by the extract.

Key words: *Saraca indica* · Methanolic Extract · Locomotor Activity · Digital Actophotometer · Rat Models

INTRODUCTION

Saraca indica is a medicinal plant widely used in Ayurveda to improves complexion of the body, in blood disease, treat painful conditions, improves digestion and assimilation, to kills all infectious agents, inflammation and also as CNS depressant [1]. *Saraca indica*, a member of family *Caesalpinaceae*, is well known as Asok, Asoka, Vanjulam. The origin of the tree is India, Burma and Malaysia. People strongly believe that the founder of Buddhist religion and the doctrine of Nirvana, Sakyamuni, was born under an Ashoka tree. All the Buddhists worship this tree. It is respected by the Hindus as well because they believe that this is the symbol of love and also dedicated directly to the God of Love, Kama Deva [2]. The bark of *Saraca indica* contains catechols, sterols, tannins, flavonoids, glycosides, leucopelargonidin and leucocyanidin. Seed and pod contains oleic, linoleic, palmitic and stearic acids, catechol, epicatechol and leucocyanidin; bark and stem found to contain quercetin, quercetin-3-O-α-Lrhamnoside, kaempferol 3-O-α Lhamnoside, amyrin, ceryl alcohol and β- sitosterol [3, 4].

Saraca indica is one of the important indigenous medicinal plants and found throughout India. Bark of the plant is bitter and traditionally used as astringent, anthelmintic, demulcent, emollient, stomachic and in blood disease, biliousness, colic, piles, ulcers, fractures, menorrhagia, metropathy, dyspepsia, visceromegaly. Bark is useful in stomachalgia and flowers are used in vitiated condition of pitta, syphilis, hyperdipsia, inflammation, dysentery, hemorrhoids and scabies in children [5-7]. The antidiabetic, oxytocic, anticancer, peptic ulcer, antimicrobial, antibacterial and antioxidant activities of the plant have been reported[8]. Plant is also important for CNS depressant activity as aerial part which is important for its CNS active, hypothermic, CNS depressant and diuretic activity [9, 10].

There are some reports showing that the plant shows the potential central nervous system depressant activity, antibacterial, antimicrobial and anti pyretic activity. Since enough scientific data is not available on locomotor activity of bark of *Saraca indica*, we have undertaken this work to validate the same.

MATERIALS AND METHODS

Plant Material: The bark of *Saraca indica* L. was collected from Jhansi region of Uttar Pradesh, India in the month of March, 2011. The plant material was authenticated by Dr. E Roshini Nayar, Principal Scientist,

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National Bureau Plant Genetic Resources (National Herbarium of Cultivated Plants), Pusa Road, New Delhi. The herbarium was prepared and voucher specimen (Sample No 01, Ref no-NHCP/NBPGR/2011/7259) was deposited at National Herbarium of Cultivated Plants and Department of Pharmaceutical Technology, MIET for future reference.

Animals: Rats (100-200 g) of either sex were used in these experiments. Animals were provided with standard food and water *ad libitum* and were maintained at a temperature of 25±2°C, humidity of 55±5% and with 12 h light - dark cycle. All animal procedures have been approved and prior permission from the Institutional Animal Ethical Committee was obtained as per the prescribed guidelines.

Extract: The bark of *Saraca indica* was washed thoroughly and dried under shade and then made into a coarse powder using dry grinder. The powdered bark was passed through sieve no. 40 and stored in an air tight container at 25°C, used for further Study. Powdered plant material (114g) was extracted using Soxhlet apparatus using the solvent methanol (60-80ºC). The extract was concentrated by distilling the solvent in a rotary vacuum evaporator and evaporated to dryness. The yield was found to be 20.63% reference to the dried plant material.

Preliminary Phytochemical Screening: The bark extracts of methanol (MSI) was subjected to qualitative chemical investigation for the identification of different phytoconstituents. Methanolic extract shows positive test for sterols, glycosides and tannins. As traditionally, the plant is used to decrease locomotor's activity. The locomotor activity of the methanolic extract of the plant in different dose levels (200, 400 mg/kg).

Locomotor Activity: In a digital actophotometer, continuous beam of light falls on photoelectric cells. When the reading is considered as zero, any cut off in the continuity of light by the animal, is recorded on a digital counter in the form of counts. Depending on CNS depressant action of the drug, the animals show reduced locomotor activity.

The animals were divided into four groups of 6 animals each. Group I served as control. Group II served as standard and treated with Diazepam (2 mg/kg body weight) intraperitonially. Groups III & IV were treated with methanolic bark extract (200 & 400 mg/kg body weight respectively) orally. The digital counts, as the number of line crossings by animal due to beam interruptions, were recorded. The counts correspond to locomotor activity. The cut off time period was 10 minutes. After 30 min and one hour, animals were individually placed in the actophotometer and the digital counts, as the number of line crossing by animal due to beam interruptions, were recorded for 10 minutes [11].

Statistical Analysis [12]: All the results obtained from various activities, as described above, were analyzed statistically by using Student's t test and $p<0.05$ were considered significant.
The results are summarized in the tables given below.

DISCUSSION AND CONCLUSION

Gamma-aminobutyric acid (GABA) is the major inhibitory neurotransmitter in the central nervous system. Different anxiolytic, muscle relaxant, sedative-hypnotic drugs are elucidation their action through GABAA, therefore it is possible that methanolic extract of *Saraca indica* may act by potentiating GABAergic inhibition in the CNS via membrane hyperpolarization which leads to a decrease in the firing rate of critical neurons in the brain or may be due to direct activation of GABA receptor by the extract [13].

Many researchers showed that plant containing flavonoids, saponins and tannins are useful in many CNS disorders [14, 15]. Earlier investigation on phytoconstituents and plants suggests that many flavonoids and neuroactive steroids were found to be ligands for the GABAA receptors in the central nervous system; which led to the assumption that they can act as benzodiazepine like molecules. Phytochemical investigations also showed the presence of glycoside, flavonoids, saponins and tannins in the extract, so might be these phytoconstituents are responsible for its CNS depressant activity.

Therefore, this plant merits further attention. Search on the most active principle as well as elucidation of the exact mechanism of its action is needed. Thus, we conclude that *Saraca indica* bark possess CNS depressant activity and studies are mandatory to establish the precise nature of active constituents as well as their mechanism of action.

This study has established the central nervous system depressant properties of *Saraca indica* bark. Increase in locomotor activity is considered as an increase in alertness and decrease in locomotor activity indicated sedative effect [16].

Table 1: Effect of methanolic extract of *saraca indica* on locomotor activity in rat

		Number of movements (for 10 minutes)			%Reduction Activity	
Groups	Dose (mg/kg)	Before Treatment	After 30 min Treatment	After 1hour Treatment	After 30 min	After 1 hour
Control	-	206.83±1.9568	207±1.8622*	208.83±1.8874*	-	-
Diazepam	2	208±1.713	98.66±1.2294*	23.66±1.2826*	52.33%	88.67%
Methanolic extract	200	209.33±1.82	185.83±1.3521*	116±1.4608*	10.22%	44.45%
Methanolic extract	400	208.5±1.5223	148.33±1.5204*	77.83±1.4928*	28.34%	62.73%

Values are expressed as mean ± SEM; n=6, *p<0.001significant as compared to control

ACKNOWLEDGEMENT

The authors are thankful to Dr. E Roshini Nayar, Principal Scientist, National Bureau Plant Genetic Resources (National Herbarium of Cultivated Plants), Pusa Road, New Delhi for identification and authentication of the plant and also to the Department of Pharmaceutical Technology, MIET, Meerut for providing research facilities to carry out the work.

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