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ANTIDEPRESSANT ACTIVITY AND PHARMACOGNOSTIC EVALUATION OF ETHANOLIC EXTRACT OF *STREBLUS ASPER* LOUR

Anil Kumar * and K. Saravanan

Department of Pharmacy, Bhagwant University, Sikar Rd, Ajmer - 305004, Rajasthan, India.

Keywords:

Streblus asper Lour, Anti-diarrheal, Anthelmintic, Antidepressant, Forces swimming test (FST), Tail suspension test (TST); MLAT, Antidepressant activity

Correspondence to Author:
Anil Kumar

Department of Pharmacy, Bhagwant University, Sikar Rd, Ajmer - 305004, Rajasthan, India.

E-mail: howruakpatel@gmail.com

ABSTRACT: *Streblus asper* Lour is traditionally used for anti-diarrheal and anthelmintic activity. The present study aims to prove the antidepressant activity in a different extract of leaves of *S. asper* Lin animal models. The extracts of *Sterblus asper* L. significantly reduced the immobility time in the forced swimming test (FST), notable at 400 mg/kg when compared with the control group. The immobility time in the tail suspension test (TST) using mice markedly reduced after acute 14 days of treatment with Despiramine Hydrochloride (30 mg/kg). Administration of extracts of *Streblus asper L.* at dosages of 100, 200, and 400 mg/kg significantly reduced the immobility time. The extracts of *Streblus asper L.* (100mg/kg) shown that the same locomotion effect as the control group. However, 200 mg/kg and 400 mg/kg doses of *Streblus asper L.* significantly increase locomotion, rearing, and defecation. The result obtained from the forced swimming test (FST), tail suspension test (TST), and measurement of locomotor activity test (MLAT) indicate that the ethanolic extract of the leaves of *S. asper* L. possesses significant antidepressant activity.

INTRODUCTION: *Streblus asper* Lour is a small tree found in tropical countries that belongs to the Moraceae family. In different areas of Bangladesh, it is called as "Shaora." *S. asper* in Asian nations like as Bangladesh, India, Sri Lanka, Malaysia, the Philippines, Vietnam, Cambodia, and Thailand was traditionally utilized as a medicinal herb [1, 2]. *S. asper* is an Indian medicinal plant, according to Indian medicinal plant data. "Mittlimara" is a kind of *S. asper*. It is also known as "bog-talay" and "Kalyos" in the Philippines. This plant has been used in a variety of interesting pharmaceutical applications.

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S. asper extracts have long been used to treat various diseases, including diarrhoea and dysentery. *S. asper* plant components are utilized for a variety of uses. The leaves have insecticidal activity against mosquito larvae, antibacterial action, and an inhibitory effect on oral and dental diseases [1, 3]. The bark extract is used to relieve toothache and gingivitis; the branch is used as a toothbrush to strengthen teeth and gums, and the bark extract relieves toothache and gingivitis. The milky juice has been used as an antiseptic and astringent, while the plant roots have been utilized to treat ulcers, sinusitis and local snake bites [1, 4].

According to the literature survey, *S. asper* also contains bioactive elements with antibacterial, antioxidant, antihyperglycemic, anticancer, anti-inflammatory, anti-diarrheal, and anthelmintic and neuropharmacological properties [5-10]. No other report regarding the antidepressant activity is

reported so far, so the current study mentioned the ethanolic extract of the leaves of *S. asper* L. possesses significant antidepressant activity.

MATERIALS AND METHODS:

Collection of the Plant Material: *Streblus asper* L. leaves were obtained locally from Azamgarh and the Bareilly region of Uttar Pradesh. Identification of plant samples was done by Professor Dr. N. K. Dubey Taxonomist, centre of advanced study in botany, institute of science, Banaras Hindu University, Varanasi (India), (voucher specimen no. mora. 2019/1).

Preparation of Extract: The crude dried powdered drugs 50 gm were kept for maceration in 200 ml ethanol for 7 days. These drugs were re-macerated, and obtained extracts were further used for chemical evaluation. The same process has been repeated with water as a solvent.

Preliminary Phytochemical Evaluation of Extract: The extracts obtained were subjected to various qualitative tests to reveal the presence or absence of common phytopharmaceuticals like flavonoids, steroids, glycosides, alkaloids, saponins, triterpenes, tannins, and phenols.

Antidepressant Activity:

Experimental Animal: Adult Swiss albino mice weighing 20-25g of both sexes were collected from the local animal house of Indore, Madhya Pradesh, India. The standard environmental conditions maintained for rats is temperature 25±2°C, humidity: 55-65% and 12h light/dark cycle. During the acclimatization period, food pellets provided the mice with fresh water and libitum. The animal was allowed to acclimatize to the laboratory condition for 14 days before experimental treatment. All the experimental animals treated following the Ethical Principles and Guidelines for Scientific Experiments on Animals (1995) formulated by Protocol approval reference number (PBRI/IAEC/PN-17047a).

Drug and Treatments: Desipramine Hydrochloride (Sandoz, Novartis Bangladesh ltd) is used as the reference drug or positive control in antidepressant-like activity tests. All animals are housed in a controlled room. Mice were divided randomly into control, positive control, and three experimental groups. Each group contained 5 mice and treated deionized water 0.1ml/ mice, Desipramine Hydrochloride (30mg/kg), EESAL (100, 200, 400 mg/kg) respectively.

Test solutions were administered orally using oral gavage once daily between 1-3 p.m. over a period of 14 days. All the experiments of these investigations were carried out at the pharmacology laboratory of the department of pharmacy, Indore.

Experimental Methods:

Forced Swimming Test (FST): In this method, animals were exposed to a situation of forced swimming based on behavioural despair. Their movements reduced after a period of vigorous activity. However, swimming movements require keeping their heads above the water.

Experimental mice were placed in an acrylic cylinder with dimensions of 45 cm and 20cm in diameter filled with water at 25°C ± 1°C to a depth of 17cm. According to the above-mentioned apparatus, a trial session in 14 days of treatment allowed the mice to swim for 15 minutes. A mouse was considered immobile if it remained floating in the water, except for small movements to keep its head above it. The FST was performed between 1-3 p.m. and recorded using a video camera. The tape was evaluated by observers not informed about each animal's kind of treatment.

Tail Suspension Test (TST): TST is a simple, reliable, and widely accepted behavioural despair model and screening antidepressant effect. TST involves suspending the tail of the mice upside down which shows the state of agitation and immobility. This reflects a state of depression.

TST apparatus contains two stands, each with a clamp located 22 cm from the floor, were placed at intervals of 23 cm. Each mouse was hung 5 cm from the floor, were placed at intervals of 23 cm. Each mouse was hung 5cm from the end of its tail on a stand and recorded with a video camera for 6 min. The TST was performed between 1-3 p.m. Immobility time was evaluated by observers.

Measurement of Locomotors Activity Test (MLAT): A mouse is placed in an open field apparatus composed of an arena 40cm in diameter divided into 64 approximately equal areas. During open-field observations, each mouse was

individually placed in the center of the arena 15th after the last treatment.

Following behavioural parameters were observed: locomotion, rearing frequencies, and several defecations within 5 min. Open field observations were performed between 8-10 a.m.

RESULTS AND DISCUSSION:

Preliminary Phytochemical Screening of Extract: The extract obtained after extraction of the plant material *viz*., *Streblus asper L.* (Stem & Leaves) was subject to phytochemical screening, which revealed the presence of various active phytoconstituents like Alkaloids, carbohydrates, glycosides, Steroids, Flavonoids, Saponins, Proteins, and amino acids.

Antidepressant Activity: The result of the antidepressant activity is given in **Tables 1, 2,** and **3**. Interestingly, *Sterblus asper* L. reduced the immobility time notable at 400 mg/kg when compared with the control group in **Fig. 1**.

Desipramine Hydrochloride also showed the same antidepressant manner **Fig. 4**. The immobility time in the TST using mice markedly reduced after acute 14 days of treatment with Despiramine Hydrochloride (30 mg/kg).

Administration of Streblus asper L. extracts at dosages of 100, 200, and 400 mg/kg significantly reduced the immobility time **Fig. 2**.

However, 200 mg/kg and 400 mg/kg doses of *Streblus asper L.* the significant increase in locomotion, rearing, and defecation. All the test animals were compared with the positive control, as shown in **Fig. 3 ABC.**

TABLE 1: EFFECT OF *STREBLUS ASPER* L. ON IMMOBILITY TIME IN FORCE SWIM TEST

S. no.	Group	Treatment	Dose	Immobility time (sec)		
				Day 1	Day 7	Day 14
1	Control	Normal Saline	0.1 ml/kg	158.5±386	152.6±2.86	147.5±3.72
2	Standard	DesipramineHCl	30mg/kg	96.4±9.10**	79±5.46**	71.5±3.71**
3	Test-1	EESAL-100	100mg/kg	143.2±0.84**	135.7±1.45***	134.6±1.70**
4	Test-2	EESAL-200	200mg/kg	136.2±1.08***	130.7±0.80***	126.8±0.40**
5	Test-3	EESAL-400	400mg/kg	122.6±2.48**	128.6±4.32**	108.67±0.41**

Values are expressed as mean ± SEM. Comparison between control *v/s* all the other groups. Statistical test done by one-way ANOVA followed by Post-hoc Tukey's multiple comparison test, *p<0.05, **p<0.01, ***p<0.001.

TABLE 2: EFFECT OF *STREBLUS ASPER L.* ON IMMOBILITY TIME IN TAIL SUSPENSION TEST

S. no.	Group	Treatment	Dose	Immobility time (sec)		
				Day 1	Day 7	Day 14
1	Control	Normal Saline	0.1 ml/kg	258.5±4.32	265.8±4.86	257.8±2.15
2	Standard	DesipramineHCl	30mg/kg	112.3±2.51**	102.8±2.46**	99.0±1.71**
3	Test-1	EESAL-100	100mg/kg	232.3±5.38***	235.8±2.95**	219.8±4.82***
4	Test-2	EESAL-200	200mg/kg	202.7±3.45**	195.2±3.80**	179.3±3.58**
5	Test-3	EESAL-400	400mg/kg	135.8±2.48**	127.6±0.92**	116.5±1.67**

Values are expressed as mean ± SEM. Comparison between control *v/s* all the other groups. Statistical test done by one-way ANOVA followed by Post-hoc Tukey's multiple comparison test, *p<0.05, **p<0.01, ***p<0.001.

TABLE 3: EFFECT OF *STREBLUS ASPER L.* IN LOCOMOTOR ACTIVITY TEST ON MICE

S. no.	Group	Treatment	Dose	Activity		
				Locomotion	Rearing	Defecation
1	Control	Normal Saline	0.1 ml/kg	92.0±3.72	14.2±4.86	0.81±0.55
2	Standard	DesipramineHCl	30mg/kg	202.25±10.0*	35.78±1.46*	3.15±0.31*
3	Test-1	EESAL-100	100mg/kg	116.3±9.90	23.8±1.45	2.03±0.42
4	Test-2	EESAL-200	200mg/kg	154.7±7.45*	24.2±0.80*	2.35±0.58*
5	Test-3	EESAL-400	400mg/kg	172.3±28.48*	32.6±1.52*	3.05±0.67*

Values are expressed as mean ± SEM. Comparison between control *v/s* all the other groups. Statistical test done by one-way ANOVA followed by Post-hoc Tukey's multiple comparison test, *p<0.05, **p<0.01, ***p<0.001.

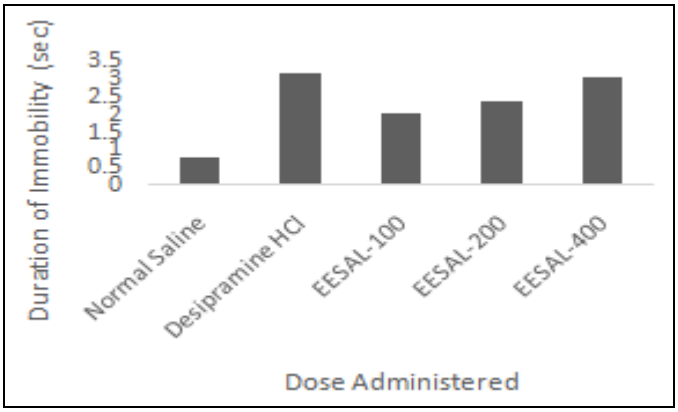


FIG. 1: EFFECT OF *STREBLUS ASPER* L. IMMOBILITY TIME IN FORCED SWIM TEST

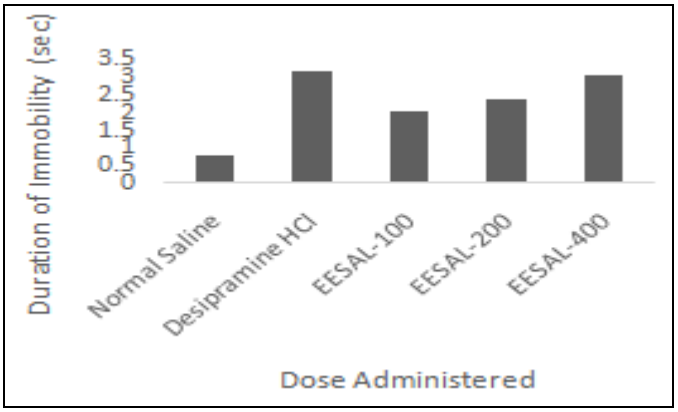
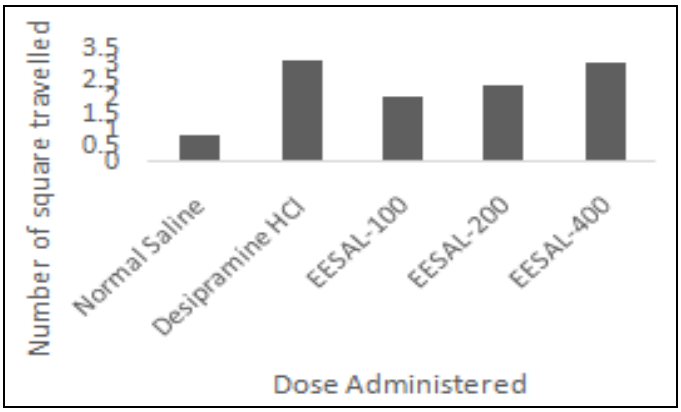
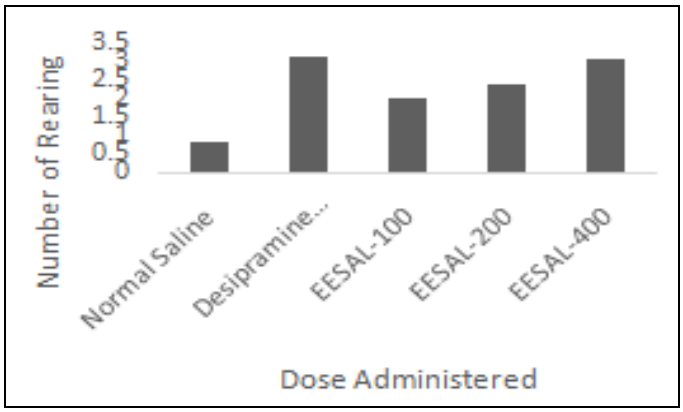


FIG. 2: EFFECT OF *STREBLUS ASPER* L. ON IMMOBILITY TIME IN TAIL SUSPENSION TEST





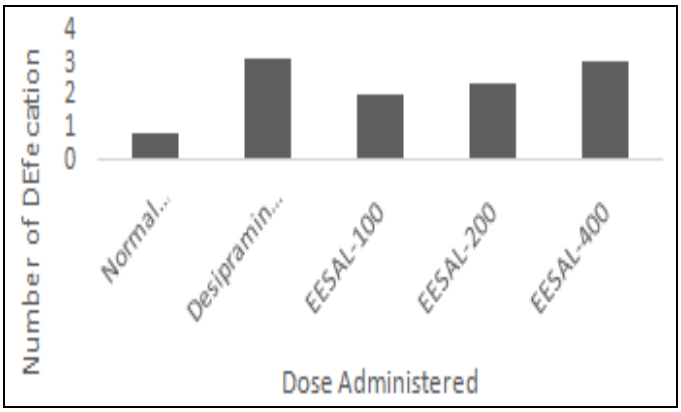


FIG. 3: (A) EFFECT OF *STREBLUS ASPER* L. ON MEASUREMENT OF LOCOMOTOR ACTIVITY TEST OF LOCOMOTION IN MICE COMPARED WITH THE NORMAL SALINE WATER (B) EFFECT OF *STREBLUS ASPER* L. ON MEASUREMENT OF LOCOMOTOR ACTIVITY TEST OF REARING IN MICE COMPARED WITH THE NORMAL SALINE WATER (C) EFFECT OF *STREBLUS ASPER* L. ON MEASUREMENT OF LOCOMOTOR ACTIVITY TEST OF DEFECATION IN MICE COMPARED WITH THE NORMAL SALINE WATER

CONCLUSION: Preliminary phytochemical screening of different extracts of leaves of *Streblus asper* L. revealed the presence of alkaloids, flavonoids, tannins, and saponins.

In the study, it was found that flavonoids are responsible for antidepressant activity. The findings obtained from the forced swimming test (FST), tail suspension test (TST), and measurement of locomotor activity test (MLAT) clearly indicate that the ethanolic extract of the leaves of *Streblus asper* L. possesses significant antidepressant-like activity. The outcome also indicates that the antidepressant-like activity was observed without the involvement of non-specific motor stimulation.

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CONFLICTS OF INTEREST: Authors have no conflict of interest.

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