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ANTIDEPRESSANT ACTIVITY OF HYDROALCOHOLIC EXTRACT OF *BUCHANANIA LANZAN*

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ABSTRACT
The present study was design to evaluate the effect of *Buchanania lanzan* hydro-alcoholic extract as well as its interaction with conventional anxiolytic and antidepressant drugs using tail suspension test and forced swim test (FST) and to evaluate the possible mechanisms involved in its actions. The fruit of *Buchanania lanzan* were collected and authenticated. Extraction of dried fruits was carried out using soxhlet apparatus to obtain its Hydro alcoholic extract. The extract of *Buchanania lanzan* showed the significant antidepressant activity comparable to the standard drug. The oral administration of *Buchanania lanzan* extract at 150 mg/ kg and 300 mg/kg respectively as compared to the control treated group showed an antidepressant activity comparable to that of standard drug. The antidepressant effects of *Buchanania lanzan* extract seem to be mainly associated with the activation of dopamineergic system and possess potential anxiolytic and antidepressant activities.

KEYWORDS: Antidepressant activity, *Buchanania lanzan*, forced swimming test, tail suspension test.

INTRODUCTION
Depression is an important global public-health issue and is associated with substantial disability.[1,2] It is a chronic illness that affects mood, thoughts, physical health and behavior of any individual and has been estimated to affect upto 21% of the world's population.[3] Synthetic antidepressants taken in appropriate doses are often associated with their anticipated side effects like dry mouth, inability in driving skills, constipation and sexual dysfunction[4] and majority of patients are reluctant to take this treatment. Accordingly, natural medicinal plants may be important sources of novel antidepressant drugs and the usage of plant extracts may be proven better in the management of stress and depression. In oriental countries, many medicinal plants from natural resources, especially Chinese medicine, such as *Plantago asiatica*, *Scrophularia ningpoensis*, and *Hypercarium perforatum* were successfully used to treat or prevent depression-like disorders.[5,6]

Buchanania lanzan (*chironji*) is a tree species which belongs to the family Anacardiaceae and is commercially very useful. This is found throughout India, Burma, and Nepal.[7] The plant grows on yellow sandy-loam soil and is commonly found in the dry forests of Jharkhand, Madhya Pradesh, Chattisgarh, Varanasi and Mirzapur districts of Uttar Pradesh.[8] *Chironji* is an almost evergreen, moderate sized tree, with straight, cylindrical trunk, up to 10-15 m height and tomentose branches. Bark is rough, dark grey or black, fissured into prominent squares, 1.25-1.75cm thick, and is reddish inside. Its leaves are thickly coriaceous, broadly oblong with a rounded base. Flowering starts in the month of November and is small, greenish-white in color

The fruits of *chironji* mature in 4 to 5 months and are harvested manually in the month of April and May. The green colored skins of harvested *chironji* fruits turn black on storage which has to be removed before shelling. In order to remove the skin, fruits are usually soaked overnight in plain water and rubbed between palms or with a jute sack. The water containing fine skin are decanted and washed with fresh water to obtain cleaned nuts. The cleaned nuts are then dried in sunlight and stored for further processing, i.e. shelling. The dried nuts are shelled by rubbing with a stone-slab on a rough surface followed by manual separation of kernels. The *chironji* kernels contain about 52% oil which oil is used as a substitute for olive and almond oils, while the whole kernel is used in sweet-meats or as a substitute for almond kernels. *Chironji* oil is extracted from the fruits of *Buchanania lanzan* and is known as "*char*" in India. It has great medicinal value; especially the kernels are used as expectorant and tonic. The oil extracted from kernels is used for treating skin diseases. Although, the *chironji* nuts and kernels have been used extensively, available literature on their physical and engineering properties is very scanty[9]

MATERIALS AND METHODS

Collection and Preparation of extract Buchanania lanzan was collected local aurvedic shop ,Indore and authenticated. The fruits were washed; air dried under shade and powdered. Powdered fruits were weighed and packed in soxhlet. Solvent used for soxhletion was mixture of methanol and water in the ratio of 50:50 respectively. Extraction was continued at the temperature of 50°C till clear solvent was observed in siphon tube. Extract was concentrated in water bath at 40°C. Concentrated extract was dried at 40°C in hot air oven. Dried extract was packed in an air tight container.

Animals

Adult male Swiss Albino rats weighing 150-200gm from our breeding stock were used in this study. They were housed in polypropylene cages under standard conditions (23 ± 2. C, humidity 60–70%, 12 h light/dark cycles). They had free access to food and water *ad libitum*. The animals were acclimatized for a period of 7 days before the study.

Acute dermal toxicity – fixed dose procedure

The acute dermal toxicity study was carried out in adult female albino rats by "fix dose" method of OECD (Organization for Economic Co-operation and Development) Guideline No.434. Exact of fruit of Buchanania lanzan was given orally at dose level 2000mg/kg.

Selection of Dose and standard drug preparation

For the assessment of antidepressant activity, dose level was chosen in such a way that, dose was approximately one tenth of the maximum dose during acute toxicity studies (150- 300mg/kg/day). Imipramine was used as the reference drug for evaluating the antidepressant activity. Imipramine was powdered and made into suspension in distilled water using.

Forced Swim Test (FST)

The method described in the literature was used in our study.[10] Each animal was placed individually in 5 liter glass beakers, filled with water upto a height of 15cm and were observed for duration of 6 minutes. The duration of immobility was recorded during the last 4 minutes of the observation period. The mouse was considered immobile when it floated motionlessly or made only those moments necessary to keep its head above the water surface. The water was changed after each test.

Tail suspension test (TST)

The method described by *Steru et al.* was used in our study. The animals were hung by the tail on a plastic string 75 cm above the surface with the help of an adhesive tape. The duration of immobility was observed for a period of 8 minutes. The duration of immobility was recorded during the last 6 minutes of the observation period. Mice were considered to be immobile only when they hung passively and were completely motionless.[11]

Groping of Animal

Animals were divided in to three groups, each group consisting of 6 rats.

Group I: Received no treatment and served as control, 1% gum acacia (10ml/kg).

Group II: Received test drug *Buchanania lanzan* (150 mg/kg/) per orally.

Group III: Received test drug *Buchanania lanzan* (300 mg/kg/) per orally.

Group IV: Received standard drug i.e. imipramine (10mg/kg).

Statistical analysis

The mean±S.E.M. statistical significance of difference of control and test data was determined by using ANOVA followed by Dunnet's multiple comparison test. $P< 0.05$ was considered to be significant. A probability value of 0.05 or less was taken to indicate statistical significance.

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RESULTS AND DISCUSSION

In both the test i.e. Forced Swim Test (FST) and Tail suspension test (TST) the extract shortened the immobility period during the forced swimming test in comparison with control and exhibited a dose dependent antidepressant activity. A significant ($P<0.01$) decrease in duration of immobility was observed as compared to that of control. The extract at a dose of 300 mg/kg body weight is found to be effective nearly similar to that of conventional drug imipramine. The results are summarized in **Table 1.**

Mood disorders are one of the most common mental illnesses, with a lifetime risk of 10% in general population. Prevalence of depression alone in general population is estimated to be around 5% with suicide being one of the most common outcomes.[12-19] Most of the drugs that are currently being used in the treatment of depression have adverse effects that affect the quality of life of the patient. This leads to patient's non-compliance to medication, which further complicates the problem.[20-21] Ayurveda mentions a number of single and compound drug formulations of plant origin that are used in the treatment of psychiatric disorders[22] and are claimed to have a better side-effect profile than conventional drugs.

Buchanania lanzan (150 and 300 mg/kg) significantly ($P < 0.001$) and dose dependently decreased the immobility time as compared to control mice (Table 1). The extract at the dose of 300 mg/kg showed the almost same activity as imipramine ($P > 0.05$), in decreasing immobility period. Tail suspension test represents the behavioural despair model, claimed to test is based on

the observation that animals, following initial escape oriented movements, develop an immobile posture when placed in an inescapable chamber. The immobility is thought to reflect either a failure of persistence in escape-directed behaviour (that is, behavioural despair) or the development of passive behaviour that disengages the animal from active forms of coping with stressful stimuli.[23] It has been argued that the TST is less stressful than FST and has greater pharmacological sensitivity.[24] Remarkably, TST detects the anti-immobility effects of a wide array of antidepressants, including tricyclic antidepressants (TCA), selective serotonin reuptake inhibitors (SSRI), monoamine oxidase inhibitors (MAOI), electro- convulsive shock (ECS) and even atypical antidepressants. Thus, the activity of *Buchanania lanzan* could involve one of the mechanism of the established agents as described above.

Table 1: Effect of *Buchanania lanzan* on duration of immobility time in the tail suspension test (TST) and Forced Swim Test (FST) using rats.

S.No	Group	Dose mg/kg	(S), TST Duration of Immobility	(S), FST Duration of Immobility
1	1% gum acacia	(10ml/kg)	193±3.51	178±1.52
2	*Buchanania lanzan*	150	141±5.06	146±1.73
3	*Buchanania lanzan*	300	135±9.29	122±4.35
4	Imipramine	10	135±9.29	119±1.15

CONCLUSION

As medicinal plants have their importance since ancient time, people using it from various ways as a source of medicine. From the above valuable animal study, we conclude that the plant extract *Buchanania lanzan* show a significant antidepressant activity in TST and FST models of depression. Thus, we can say that *Buchanania lanzan* significantly reduces the immobility period in both TST and FST.

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