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## **Preliminary Central Nervous System Effects of the Aqueous Seed Extract of *Mucuna pruriens* in Mice**

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### **ABSTRACT**

The seeds of *Mucuna pruriens* commonly called Velvet or *Mucuna* beans have extensively been used in Brazilian and Indian traditional Ayurvedic medicine for many ailments. Exploratory behaviors are affected by drugs based on the types of neurotransmitter they interact with in the brain. Diazepam-induced sleep test in four groups of 6 mice treated with intraperitoneal distilled water (10 mL kg<sup>-1</sup>), 600, 300 and 150 mg kg<sup>-1</sup>; hole board test for exploratory behavior in 5 groups of mice treated with intraperitoneal distilled water (10 mL kg<sup>-1</sup>), diazepam (1.5 mg kg<sup>-1</sup>), 600, 300 and 150 mg kg<sup>-1</sup> of *Mucuna pruriens* aqueous seed extract respectively were carried out. The studies showed that *Mucuna pruriens* significantly and dose-dependently prolonged the duration of diazepam-induced sleep which suggests that it possess sleep inducing property. The ability of the extract to significantly reduce the number of head dips in the hole-board test corroborates the CNS depressant potential of the plant extract. It is concluded that *Mucuna pruriens* may be a remedy in some CNS disorders.

**Key words:** Ayurvedic, *Mucuna*, diazepam, sleep, hole-board

### **INTRODUCTION**

Traditional medicine enjoys high patronage in the treatment of CNS disorders (Magaji *et al.*, 2008). *Mucuna pruriens* is a plant grows well in tropical areas of India, West Indies and Africa. It has been described as a multipurpose plant which is used extensively for its nutritional as well as medicinal properties. Isolates from *Mucuna pruriens* have shown some CNS effects including hallucinogenic activity, behavioral changes, antagonism of phentobarbitone-induced hypnosis, and inhibition of reserpine-induced ptosis, hypothermia, sedation among others. Because of its wide nutritional and medicinal uses, we investigated some of its neurobehavioral effects in mice.

Diazepam acts on areas of the limbic system, thalamus and hypothalamus thereby inducing anxiolytic effects.

Considering the claim that the *Mucuna pruriens* has various effects on body systems especially the CNS and its availability in different parts of the world, hence the need to investigate some of the neurobehavioral effects of the plant extract. Therefore, this study is aimed at assessing the potentials of *Mucuna pruriens* on exploratory behavior of mice.

## MATERIALS AND METHODS

**Preparation of the plant material:** *Mucuna pruriens* seeds were extracted using cold maceration with distilled water to obtain the aqueous extract.

**Phytochemical screening:** The aqueous extract was screened for the presence of various phytochemicals using conventional protocols (Trease and Evans, 1983).

**Animals:** Sixty two mice (14 g to 30 g) were used for the experiment. The animals were divided for the acute toxicity study (13 mice), sleeping time and hole-board tests into four groups of 6 mice each (24 mice) and five groups of 5 mice (25 mice), respectively.

**Acute toxicity study:** Median Lethal Dose ( $LD_{50}$ ) determination was conducted according to the method of Lorke (1983).

**Diazepam-induced sleep in mice:** The method described by Rakotonirina *et al.* (2001) was used for diazepam-induced sleep model in which four groups of 6 mice were treated with distilled water ( $10 \text{ mL kg}^{-1}$ ), 600, 300 and  $150 \text{ mg kg}^{-1}$  of the seed extract of *Mucuna pruriens*, respectively intraperitoneally.

**Hole-board test for exploratory behavior:** Hole-board method test (File, 1973) in mice was used for exploratory behavior. In this test, the frequency and duration of head-dipping are assumed to provide for measures of neophilia that are independent from the general locomotor activity of the animal (File and Wardill, 1975). Five groups of 5 mice each were administered distilled water ( $10 \text{ mL kg}^{-1}$ ), diazepam ( $1.5 \text{ mg kg}^{-1}$ ), 600, 300 and  $150 \text{ mg kg}^{-1}$  of *Mucuna pruriens* aqueous seed extract, respectively intraperitoneally.

**Statistical analysis:** Results obtained were expressed as Mean $\pm$ SEM. Data was analyzed using one way ANOVA followed by Least Square Difference (LSD) *post hoc* test. The  $p$ -value $<0.05$  was considered significant.

## RESULTS AND DISCUSSION

**Phytochemical screening:** The preliminary phytochemical analysis of the *Mucuna pruriens* aqueous seed extract revealed the presence of alkaloids, cardiac glycosides, carbohydrates, flavonoids, saponins, steroids, terpenoids, tannins among others.

**Acute toxicity study:** The intraperitoneally  $LD_{50}$  of the *Mucuna pruriens* aqueous seed extract was found to be  $2154.07 \text{ mg kg}^{-1}$  in mice.

**Diazepam-induced sleep in mice:** The *Mucuna pruriens* seed extract treated groups of 600, 300 and  $150 \text{ mg kg}^{-1}$  significantly ( $p<0.05$ ) and dose-dependently prolonged the duration of diazepam-induced sleep with results of  $183.2\pm 18.1$ ,  $126.0\pm 17.6$ ,  $128.2\pm 35.5$  min, respectively as compared to the control group with  $85.0\pm 25.1$  min. On the other hand, there was no significant statistical difference in the onset of sleep between the experimental groups with  $3.8\pm 0.6$ ,  $4.2\pm 0.4$ ,  $3.8\pm 0.4$  min, respectively as compared to the control group with  $4.4\pm 0.5$  minutes as shown in Table 1.

Table 1: Effect of aqueous seed extract of *Mucuna pruriens* on diazepam-induced sleep in mice

Groups	Sleep parameters (min)	
	Onset of sleep	Duration of sleep
Control (10 mL kg <sup>-1</sup> ) distilled water	4.4±0.5	85.0±25.1
<i>Mucuna pruriens</i> (600 mL kg <sup>-1</sup> )	3.8±0.6	183.2±18.1*
<i>Mucuna pruriens</i> (300 mL kg <sup>-1</sup> )	4.2±0.4	126.0±17.6*
<i>Mucuna pruriens</i> (150 mL kg <sup>-1</sup> )	3.8±0.4	128.2±35.3*

\*Statistically significant with p<0.05

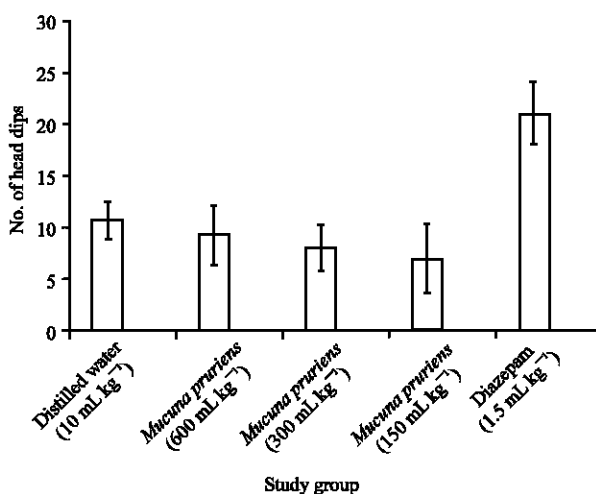


Fig. 1: Effect of aqueous seed extract of *Mucuna pruriens* on number of head dips in hole-board test in mice

**Hole-board test for exploratory behavior:** The seed extract of the *Mucuna pruriens* in the doses of 600, 300 and 150 mg kg<sup>-1</sup> significantly (p<0.05) decrease the number of head dips in the hole-board test with 9.2±2.9, 8.0±2.2, 6.9±3.4 number of head dips as compared to the control group with 10.6±1.8 number of head dips as shown in Fig. 1.

The studies showed that *Mucuna pruriens* significantly and dose-dependently prolonged the duration of diazepam-induced sleep. This suggests that it possess sleep inducing property (Bardo *et al.*, 1996) The ability of the extract to significantly reduce the number of head dips in the hole-board test corroborates the CNS depressant potential of the plant extract (File, 1973). Some studies have confirmed the use of *Mucuna pruriens* in folklore as: a nerve tonic for CNS disorders; antidote to snake venom; aphrodisiac in both males and females and anti-diabetic, among others. This means that *Mucuna pruriens* may be a remedy in CNS and sexual diseases (Manyam *et al.*, 2004).

## CONCLUSION

It is therefore concluded that further study will include isolation of the bioactive principle(s) responsible for the observed activities. It will also be good to carry out an in-depth study to determine the mechanism by which *Mucuna pruriens* may act on the CNS.

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