

ACUTE ORAL TOXICITY OF *MUCUNA PRURIENS* IN SWISS ALBINO MICE

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ABSTRACT

Mucuna pruriens, belonging to the botanical family Fabaceae, has been used in traditional Ayurvedic Indian medicine for various ailments including Parkinson's disease. The current study reports the outcome of acute oral toxicity investigation of ethanolic extract of *M. pruriens* (whole plant) on Swiss albino mice. No mortalities or evidence of adverse effects have been observed in Swiss albino mice following acute oral administration of ethanolic extract of *M. pruriens* at the dose of 2000 mg/ kg. This is the first report on the acute oral toxicity of *M. pruriens* and thus the findings of this study provide scientific validation on the use of the *M. pruriens* as a medicine for treating various ailments.

KEYWORDS: Acute oral toxicity, *Mucuna pruriens*, Swiss albino mice

INTRODUCTION

Medicinal herbs have always been used as traditional primary healthcare agents, especially in Asian countries. Over the last 20 years, rapid changes have been observed in the popular use of natural products from plant sources for maintenance of health and for alternative therapy, in Western countries¹.

M. pruriens is a widespread fodder plant in the tropics. It is an annual, climbing shrub with long vines that can reach over 15 m in length. When the plant is young, it is almost completely covered with fuzzy hairs, but when older, it is almost completely free of hairs.

Various parts of *M. pruriens* have been claimed to be useful in conditions like dysmenorrhoea, amenorrhoea, menorrhagia, infertility in females and lack of libido, stamina, sex drive, spermatorrhea, impotency in males. *M. pruriens* seeds contain high concentrations of levodopa a direct precursor of the neurotransmitter dopamine and it has long been used in traditional Ayurvedic Indian medicine for diseases including Parkinson's disease². In general, it is observed that, the plant is used as a traditional medicine in animals and also as an ingredient of various herbal products used for male reproductive disorders in human.

Although *M. pruriens* is reported to be used in a large number of traditional as well as commercial compound Ayurvedic preparations, there is no published report on the study of acute oral toxicity of *M. pruriens*. Thus, present study was planned to carryout acute toxicity

study of ethanolic extract of *M. pruriens* in Swiss albino mice. Such studies need to be carried out before the continued widespread use of some plant species which provokes long-term and irreversible damage.

MATERIALS AND METHODS

The protocol of the study (Table 1) was approved by the Institutional Animal Ethics Committee of Krantisingh Nana Patil College of Veterinary Science, Shirwal - 412 801, Dist - Satara, Maharashtra state, India.

Plant Sample Collection and Identification

The whole plant of *M. pruriens* were collected from the surrounding locality of the institute, washed and dried under shade in laboratory. The plant material was identified for its authenticity and voucher specimens were kept in pharmacology division for future reference.

Plant Extraction

Shade dried whole plants of *M. pruriens* were ground to powder form in grinder. The ethanol extract of powder was obtained by extracting in Soxhlet Extraction apparatus by continuous hot extraction method at 60 °C for 35 hours and dried in rotary vacuum evaporator to get dark green extract.

Animals

Six inbred Swiss albino adult nulliparous and non-pregnant mice (03 female and 03 male) of 08 – 10 weeks of age, weighing 25 ± 2 g maintained on standard managemental practices were procured from M/S. Raj Biotech, (Reg. no. 449/01/b/ CPCSEA), Bhor Dist. Pune (Maharashtra). They were housed in a clean

polypropylene cage and maintained under standard laboratory conditions (temperature $25 \pm 2^\circ\text{C}$ with dark/light cycle 12/12 h) throughout the experiment. The animals were provided with commercial pellet feed (Amrut Feed Industries, Pune) and water *ad libitum*. The animals were acclimatized to laboratory conditions for one week prior to experiment.

Procedure of Acute Oral Toxicity

Three female and three male Swiss albino mice were selected randomly and housed separately in white polypropylene cages in an experimental animal room. The cages were marked for individual identification and provided with husk as a bedding material. The acute oral toxicity of ethanolic extracts of *M. pruriens* in Swiss albino mice was carried out as per OECD (Organization for Economic Co-operation and Development) guidelines 423³. Ethanolic extract of *M. pruriens* plant was administered to individual mice at the dose rate of 2000 mg/kg body weight, in 0.5 ml of distilled water. The mice were observed carefully for signs of toxicity in the first four hours after the treatment period, and daily thereafter for a period of 14 days. Parameters such as mortality, signs of illness, injury, pain, distress, allergic reactions, changes of outer appearance, behavioral alterations (i.e., ataxia, hyperactivity, hypoactivity), and general stimulation or sedation were observed twice daily, whereas feed intake, water intake and body weight were recorded weekly once during the study period of 14 days, after the oral administration of ethanolic extract of *M. pruriens*. The observations were recorded systematically; individual records were maintained for each mouse. On 15th day of study all surviving mice were sacrificed humanely as per CPCSEA guidelines and detailed necropsy was carried out.

RESULTS

Extraction Yield

Ethanolic extraction of *M. pruriens* plants finally yielded 17 % (w/w) dark green extract.

Acute Oral Toxicity Assessment

Investigation of acute toxicity is the first step in the toxicological analysis of herbal drugs. Present study was undertaken to determine acute oral toxicity and safety parameters of ethanolic extract of *M. pruriens* plant.

No mortality was reported in experimental mice when ethanolic extract of *M. pruriens* was administered orally at 2000 mg/kg body weight. Also there were no significant changes observed in behavior (i.e. ataxia, hyperactivity, hypoactivity) in any of the mice, nor did they show any variations in the general appearance throughout the 14-day study period. Body weight gain, feed intake and water consumption were found to be normal during the course of the study.

DISCUSSION

As no mortality, no adverse changes in behavior of animals as well as no abnormalities were detected at necropsy in experimental mice at the dose rate of 2000 mg/kg body weight, the ethanolic extract of *M. pruriens* plant was assigned to class 5 ($\text{LD}_{50} > 2000 \text{ mg/kg}$), which were recommended by OECD.

CONCLUSION

In view of the popularizing the consumption of medicinal plants as alternative therapy, it is necessary to conduct research for standardization of herbal medicinal plants with respect to their safety and toxicity assessment in laboratory animals to ascertain their safety for human consumption. The present research findings have clearly met the objectives of the study. Based on the outcome of acute toxicity in experimental mice, the ethanolic extract of *M. pruriens* could be regarded as safe in experimental mice. Further toxicity study over a longer period of time involving detection of effects on vital organ functions would ensure that the plants are safe for human consumption.

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Table 1. Study protocol

Name of the study	Acute toxicity study of <i>Mucuna pruriens</i> .
Test material	Ethanolic extract of <i>Mucuna pruriens</i> plant.
Details of Animal used	Swiss albino mice (03 Female and 03 Male).
Route of test drug administration	Oral administration with the help of gavage needle.
Dose and volume of drug administered	2000 mg/kg body weight in 0.5 ml distilled water.
Study duration	Acclimatization for 7 days and 14 days study period.
Parameters observed	Mortality, signs of illness, injury, pain, distress, allergic reactions, changes of outer appearance, behavioral alterations were observed daily and feed intake, water intake and body weights were recorded weekly once.

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