



Research Article

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**COMPARATIVE PHARMACEUTICAL STUDIES IN SEED MATERIALS OF MARKET SAMPLES
OF ATMAGUPTA (*MUCUNA PRURIENS* (L) DC)**

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ABSTRACT

Mucuna pruriens (L.) DC. (Papilionaceae) is used in male impotency, as aphrodisiac, in sexual debility, and as nervine tonic. It also possesses anti-parkinson property, possibly due to the presence of L-DOPA. Market samples of 'Atmagupta' (*Mucuna pruriens* (L.) DC) an Indian Ayurvedic and Siddha drug contain seeds of seven taxa. The dried powders of commercial and genuine samples were analysed for L-DOPA content and CNS activity. Results showed high L-DOPA content in *M. deeringiana* and low L - DOPA content in *Canavalia ensiformis*. *C. virosa* had more CNS depressant activity than other species studied. The present findings also suggested that the commercial samples contain different concentration of L-DOPA and CNS activity compared with genuine.

Key words: CNS activity, L-DOPA, *Mucuna pruriens*.

INTRODUCTION

Mucuna pruriens (L.) DC has long been used as a medicinal plant by traditional healers. The seeds of this plant have been used as food, tonic and aphrodisiac (Vasudeva and Shanpru, 1981) by many tribal communities in India since many centuries. *M. pruriens* possess valuable medicinal properties and it has been studied for various activities like anti-diabetic (Akhtar *et al.*, 1990); aphrodisiac, anti-neoplastic, anti-epileptic and antimicrobial activities (Sathiyarayanan and Arulmozhi, 2007). It has learning and memory enhancement property (Poornachandran *et al.*, 2005). Its aphrodisiac and antivenom activities have been detailed respectively by Rajendran *et al.* (1997), Shukla *et al.* (2007), Guerranti *et al.* (2002) and Fattepur *et al.* (2008). The seeds of this plant are collected mostly in the wild. Various species of *Mucuna* are being sold in the market under the trade name "Atmagupta". Our preliminary survey in Tamil Nadu (Vijayambika, 2003) also revealed that seeds of seven species *Mucuna pruriens*, *M. cochinchinensis*, *M. deeringiana*, *M. utilis*, *M. atropurpurea*, *Canavalia ensiformis*, and *C. virosa* are sold as 'Poonaikali' (Tamil vernacular name of *M. pruriens*). *Mucuna pruriens* has been shown to be effective in the treatment of Parkinson's disease, possibly due to the presence of L-DOPA (Ghazala Hussian and Bala Manyam, 1998). In the present study, attempts were made to compare the commercial and genuine samples of *M. pruriens* by the L-DOPA content and CNS activity.

MATERIALS AND METHODS

Seeds of different samples of 'Poonaikali' were purchased from Herbal drug stores from different places of Tamil Nadu like, Kanyakumari, Kalakad, Tirunelveli, Madurai, Thanjavur, Myladuthurai and Chennai. All the samples of seed were sown in Tamil University Herbal Garden, Thanjavur. Botanical identity of the samples was established based on the morphology of the seeds, vegetative and floral parts. The identity was confirmed by comparing voucher specimens available in the Botanical Survey of India, Coimbatore and Calcutta. A selective, precise, and accurate Calorimetric and thin-layer chromatographic (TLC) methods have been developed for the analysis of L-DOPA in chosen seed extracts. The method involves densitometric evaluation of L-DOPA after resolving it by TLC on silica gel plates with n-butanol-acetic acid-water (4.0+1.0+1.0, v/v) as the mobile phase. Densitometric analysis of L-DOPA was carried out in the absorbance mode at 550 nm.

CNS STUDY

Swiss albino mice (30-35) of either of sex were divided into nine groups of 4 animals each. Mice from all the groups were injected with Reserpine (2mg /kg; i.p) and the effect of locomotor activity of the mice were tested after 24 hours. The basal activity score of the animals were noted in a activity cage

(INCO) for 10 min. Extract (250 gm/Kg; i.p.) was administered into group of animals ; while the animals in the reference group received 3 mg/Kg Chlorpromazine (Kulkarni, 1999). After 30 min, each mouse was tested for activity scores for 10 min. Difference between the score before and after drug administration was noted and the percentage decrease in motor activity was calculated. The results were analysed using one way ANOVA followed by students test. P-values less than 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

Quantitative estimation of L-DOPA in seed samples (Table - 1) revealed that *M. pruriens* seeds contain the highest amount (6.5%) among the samples tested. The L-DOPA contents varied significantly in different species and ranged between 0.7 to 6.5% in Calorimetric method. The minimum L-DOPA content was recorded in *Canavalia ensiformis* and the maximum in *Mucuna pruriens* (dried). By TLC densitometric method L-DOPA content in all the seed samples was very low. This lower estimate of L-DOPA content might be due to precise estimation of L-DOPA in single absorption maxima at 550 nm.

Alcoholic extract of seeds of *M. pruriens* revealed significant CNS depressant action. In this study, all extracts produced decreased activity scores with respective control group (prior to drug treatment) and it was due to a pronounced depressant action. The maximum percentage decrease in activity at 250 mg/kg of *C. virosa* treated group was 93.4 per cent. The percentage decrease activity of *C. ensiformis* was found to be 31.9 per cent and it was less active in groups treated with other sample drugs (Table: 2). Depressant activity scores of the seeds were in the following descending order: CV>MC>MA>MP.bt>MD>MU>CE. It is evident from this activity that though *M. pruriens* seeds have the highest content of L-DOPA of all the seeds studied. CNS activity was not commensurate with L-DOPA content. It is possible that other biological active compounds other than L-DOPA would also effect CNS depressant activity. Rajendran *et al.*, (1996) working on *M. pruriens* seeds also reported that L-DOPA free fractions of *M. pruriens* seeds also possess significant anti-parkinsonian activity. In another work, *M. pruriens* seeds are more effective than pure L-Dopa on Parkinsonian disease (Hussain and Manyan, 1997). In the present work, burnt seeds of *M. pruriens* which contains higher amount of L- DOPA have more CNS activity. Further studies are needed to know pretreatment of seeds would reduce anti-nutritional factors and enhance pharmaceutical activity.

Standardization and scientific valuation of the drugs are essential for their better therapeutic utilization. Efficacy testing of the traditional and new herbal products in experimental screening method is important to establish the active component and appropriate extract of the plant (Chakravarty, 1993).

The current emphasis of new drug discovery processes from plants is the development of products with new pharmacological modes of actions apart from the known advantage of structural novelty.

Table 1: L – DOPA content of *Mucuna* and *Canavalia*

Sl. No	Name of the samples	Colorimetric method %	TLC method %
1.	<i>Mucuna pruriens</i> (dried)	6.5	1.86
2.	<i>M. pruriens</i> (burnt)	6.13	1.33
3.	<i>M. cochinsinensis</i>	4.0	1.21
4.	<i>M. deeringiana</i>	5.68	0.846
5.	<i>M. utilis</i>	5.3	0.759
6.	<i>Canavalia ensiformis</i>	0.7	0.03
7.	<i>C. virosa</i>	1.5	0.058
8.	<i>M. atropurpurea</i>	4.76	1.189

Table 2: Effect of alcoholic extract of *Mucuna pruriens* and its adulterants on locomotor activity

Treatment	Dose mg/kg	Locomotor activity scores in 10 min		% decrease in activity
		Before treatment	After treatment	
Chlorpromazine	3	406 ± 20.2	198 ± 11.2	51.23 ^b
<i>Mucuna pruriens</i> (dried)	250	396 ± 4.90	254 ± 75.9	35.86 ^a
<i>M. pruriens</i> (burnt)	250	407 ± 16.1	116 ± 65.1	71.49 ^b
<i>M. cochinsinensis</i>	250	394 ± 21.5	70 ± 46.3	82.23 ^b
<i>M. deeringiana</i>	250	450 ± 57.5	153 ± 74.6	66.00 ^b
<i>M. utilis</i>	250	340 ± 40.5	159 ± 37.9	53.23 ^b
<i>Canavalia ensiformis</i>	250	420 ± 52.5	286 ± 74.9	31.91 ^a
<i>C. virosa</i>	250	440 ± 52.3	29 ± 5.0	93.41 ^b
<i>M. atropurpurea</i>	250	423 ± 99.4	83 ± - 10.2	80.38 ^b

a - significant at 0.05 level

b – significant at 0.001 level

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