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A Comparative Study on *Mucuna pruriens* to Treat Parkinson's Diseases by Using Analytical Instrumentation

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ABSTRACT

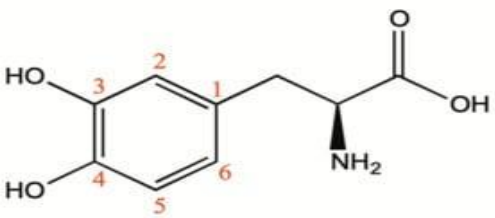
Velvet bean is established as an herbal drug used for managing male infertility, nervous disorders, and aphrodisiacs. In the present study, which is used by the reversed phase HPLC method was developed for the estimation of the *Mucuna pruriens* is amino acid at L-DOPA. The neurotransmitter is used in the treatment of Parkinson's disease. In addition, they are used in the treatment of menstruation disorder, fever, tuberculosis, etc., In ancient times, *Mucuna pruriens* is an 'ayurvedic medicine system'. It is traditionally used in India. The review summarizes the scientific characteristic, chemical constituents, dose, Benefits, and uses of *Mucuna pruriens*. The RP-HPLC method composed extract with Methanol, water, Ascorbic acid for the detection of levodopa and some physio-chemical parameters. Low-cost effect and the retention time is accurately good.

INTRODUCTION:

Mucuna pruriens is creeping vine that can be found growing in India, Caribbean, tropical areas of Africa. The tropical plant is known as 'VELVET BEAN'. They are commonly called as Florida velvet bean, Bengal velvet bean, Mauritius velvet bean, Yakama velvet bean, cowhage, cowitch, hakuna bean and Lyon bean. In the ancient period, the Sanskrit name of *mucuna pruriens* is 'ATMAGUPTA' means ' SECRET SELF' and 'KAPIKACCHU' means ' one starts itching like a monkey'. In Spanish ,it is commonly known as pica-pica , chiparro, guisante, negro, chhican, Odo de venado. *Mucuna pruriens* live coating of hairs that covers a seed pod, they are notorious plant that produce extreme itchiness and produce medium sized red swollen limps through itching. In agriculture and horticulture are used as herbalism. The seeds are naturally containing levodopa and commonly known as L-DOPA at high concentrations of 4-7%. It contains hallucinogenic tryptamines, phenols and tannins. *Mucuna pruriens* is source of crude protein at essential fat acids, starch and amino acids are the medicinal properties. Levodopa is the main intermediate which cause amino-acid as a very precursor of dopamine which ris used to penetrates the brain and in blood brain barriers are in the decarboxylated of the dopamine. It acts mainly by brain dopamine. It improves L-Dopa, (3,4-dihydroxyphenyl)-L-alanine, structure and its chemical and physical properties.

Chemical Properties

Formula $C_9H_{11}NO_4$
Exact Mass: 197.069
Mol. Wt.: 197.188
Boiling Point: 537.89 [°C]
Melting Point: 396.26 [°C]
Log P: 0.05
Critical Temp: 588.32 [°C]
Critical Pres: 59.26 [Bar]
Critical Vol: 510.5 [cm^3/mol]
Gibbs Energy: -451.83 [kJ/mol]
Heat of Form: -668.94 [kJ/mol]



Scientific classification:

Kingdom – Plantae

Order – Fabales

Family- Fabaceae

Sub family- Faboidae

Genus- Mucuna

Species- *M. pruriens*

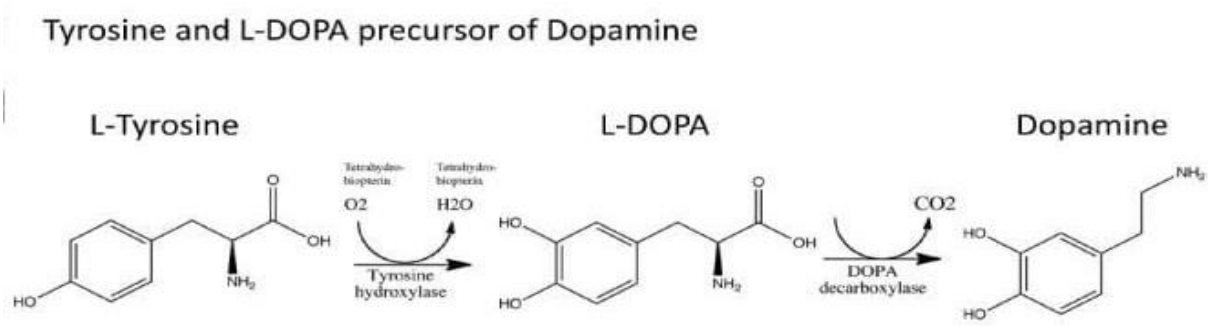
Velvet beans bears white, lavender or purple flowers. The pods of plants are range in 10-20 cm long and covered at loose white cream hairs that immediately serve itching.

Although *Mucuna Pruriens* Extract Powder comes from a bean, it has a distinctive smoky, caramel flavour.

Mucuna pruriens seed contains 71.5 µg/mL of vitamin A, 144.4 µg/ml of vitamin B 1 , 42.5 µg/ml of vitamin B 2 , 13.7 µg/ml of vitamin B 3 and 4.3 mg/100g of vitamin C [6] , 0.87 mg/100g of Vitamin B 6 and 0.47mg/100g of vitamin B 12.

Chemical constituents:

Mucuna pruriens contains levodopa as well as two components of the mitochondrial electron transport chain; coenzyme Q10 and nicotine adenine dinucleotide (NADH).



The reaction represents the two steps involved in the formation of dopamine from l-tyrosine and the non-protein amino acid L-dopa (the main phenolic compound contained in *M pruriens.*)

Dose:

Dosages as low as 100 mg per day may still generate the *Mucuna pruriens* dopamine response, while up to 1 gram per day is generally considered very safe.

MATERIALS AND METHODS:

- Samples of velvet bean, Mucuna utilis (black colored seed coat) were collected from an evergreen forest in Ibadan, Nigeria.
- After thoroughly drying in the sun the pods were thrashed to remove seeds.
- The dry seeds sample were ground into powder form using pestle and mortar.
- The powder was sieved through a 0.002mm wire mesh to obtain fine powdered forms.
- The powdered seed samples were kept in Mc Cartney bottles and each of the extracted oil was used for the determination stored in the desiccators for analysis later.

Proximate Composition:

- The proximate analyses of the samples for moisture ,total as hand crude fibre were carried outing triplicate using theme thods described by AOAC.
- The nitrogen was determined by the micro Kjeldahl method described by Pearson and the nitrogen content was converted to protein by multiplying by a factor of 6.25.

- Crude lipid content was determined using Soxhlet apparatus and Carbohydrate content was determined by difference.

- All the proximate values were reported in %. Total Dietary Fiber (TDF) was estimated by the non-enzymatic gravimetric method.

Determination of mineral Elements:

- The minerals were analysed by dry ashing the samples at 550°C to constant weight and dissolving the ash in volumetric flask using distilled, deionized water with a few drops of concentrated hydrochloric acid.

- Sodium and potassium were determined by using a flame photometer using NaCl and KCl to prepare the standards.

- All other metals were determined by Atomic Absorption Spectrophotometer.

- All determinations were done in triplicate. All chemical used were of analytical grade.

  Earlier, the detection limits of the metals had been determined according to Techtro.

- The optimum analytical grade was 0.1to0.5 absorbance units with a coefficient of variation of (0.87-2.20) %.The minerals were reported as mg/100 g.

Extraction Method

The seeds are dried of M. pruriens and which is powdered very minutely. The powder of the seeds of *Mucuna pruriens* which is in Black or White (0.0100 gram) has been weighed and transferred through a conical flask. Add 150 ml of the petroleum ether with the conical flask. And then keep it in a magnetic stirrer for 1.5 hours. Filter the content through it dried for 45 minutes. Petroleum ether part has been discarded. Extract powder has mixed with thr50% methanol (100 ml of methanol and 100 ml of water, the total volume used for 200 ml). Ascorbic acid 2 gm at the temperature of 50-70ºC. Magnetic stirrer has 2 hours. Again the material has filtered and keep it in the refluxed three times with 40% methanol (20 ml of methanol and 170 ml of water, the total volume used200 ml) and with 20% methanol (150ml of methanol and 50 ml of water, the total volume used 150 ml). Following this, all the extracts were pooled together, concentrated up to 40%under vacuum using rota-vac (IKA, Japan).

Chromatographic Condition

HPLC evaluation was performed under In the chromatographic temperature on RP-C18 analytical column. Mobile phase used were Methanol: Water (20: 70 v/v) with a Flow rate of 1.5 mL/min eluted. A sample quantity of 10µL was injected to the sample injector. Retention time was found to be 5.269± 0.3 min.

HPLC PARAMETERS

Validation Parameters of Developed Method

Validation of developed method was carried out as per ICH guidelines. Parameters such as Linearity, Accuracy, Precision, LOD and LOQ were taken up as tests for analytical method Validation.

Linearity

The linearity was evaluated by analyzing different concentrations of the standard solutions of L-Dopa. The BeerLambert's concentration range was found to be 10-50 µg/ml.

Accuracy

To a certain form of the accuracy is proposed in the methods, for recovery studies were carried in three different levels (80%, 100% & 120%). Average percent recovery was found to be 99.83 %.

Precision

Precision is the repeatability which forms and carried out in the three level and RSD percentage are very low.

LOD & LOQ

The LOD and LOQ of developed method were calculated by using equations

: The LOD and LOQ of developed method were calculated by using equations:

Limit of Detection (LOD): $3.5 \times \sigma/S$

Limit of Quantification (LOQ): $10 \times \sigma /S$

Where, σ = The Standard deviation of the response, S = Slope of calibration curve.

BENEFITS AND USES:

- Promotes a healthy nervous system.
- Supports the brain and intellect.
- Supports motors kills and coordination.
- Revitalizes their productive system.
- Supports healthy digestion and elimination.
- Provides significant nutritional content.
- Natural source of levodopa (L-dopa).

❖ Dietary intake of these beans may reduce FSH and Prolactin. Therefore, it may improve female fertility.

❖ It also enhances the testosterone hormone, an essential male hormone for sperm synthesis.

❖ Studies suggest that treatments with velvet beans show significant improvement in sperm count and sperm motility.

❖ Helps improve cognitive processes, voluntary movement, sleep, mood, working memory, healthy digestion, balancing blood sugar levels and learning.

❖ Studies have found that supplementing with *Mucuna pruriens* can improve symptoms of depression, anxiety, and stress.

❖ Enhanced Cognitive Function: In addition to improving mood, *Mucuna pruriens* may also enhance cognitive function. Dopamine plays a crucial role in learning, memory, and attention.

❖ *Mucuna pruriens* seeds are capable of exerting positive structural changes in pancreas &liver through its antioxidant and antidiabetic properties.

Adverse effects:

❖ Avoid use during pregnancy.

❖ The safety for use during lactation has not been established.

❖ The seed pods are covered with hairs that can cause itching and severe irritation to the skin (dermatitis).

❖ Side effects may include headache, pounding heartbeat, and symptoms of psychosis such as agitation, confusion, hallucinations and delusions.

❖ A powdered preparation of velvet bean seed, called HP-200, is possibly safe for most people when taken by mouth for up to 20 weeks.

❖ Contact with needle-like, stinging hairs on the seed-pods of this plant can release minute amounts of Dimethyltryptamine and other poisonous alkaloids which can cause SKIN IRRITATION AND SKIN RASH (DERMATITIS).

CONCLUSION:

Mucuna pruriens is gained popularity due to its extensive medicinal properties. It prevents the process of Parkinson's disease. It naturally contains L-DOPA. L-DOPA also contains pharmaceutical purpose. It is used a protein source for human purposes and young leaves used for animal fodder. The bioactive compounds are phenol, polyphenols and tannins. Dopamine is produced in brain cells. New protective drugs may prevent or reverse the disease. In the analytical instrumentation method they are very low in cost effective the retention time is very accurate in the calibration process.

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