L-Dopa is the drug of choice in the treatment of Parkinson’s disease but it has dose related adverse effects such as nausea, vomiting, orthostatic hypotension, end of dose deterioration, on off phenomena and on chronic therapy motor complications synonymous to parkinsonism. *Mucuna pruriens* (M.P) commonly known as velvet beans or cowitch are used in case of spasms associated with Parkinsonism. Clinical efficacy of seeds of this plant was confirmed and the efficacy was contributed to its L-Dopa content. M.P extract showed twice the antiparkinsonism activity compared with synthetic L-Dopa. There is sufficient L-Dopa in broad bean (*Vicia faba*) pods. One study proved its efficacy in Parkinsonism. *Ginkgo biloba* extract showed protective effect in vivo and invitro. 50% ethanolic extract of *Plumbago zeylanica* was effective in rats. The following plants were reported to have L-Dopa but their protective effect is yet to be established in animal models. *Vigna aconitifolia*, *Vigna unguiculata*, *Vigna vexillata*, *Prosopis chilensis*, *Pileostigma malabarica*, *Phanera vahlis*, *Parkinsonia acculeata*, *Macuna urens*, *Canowalia glandiata*, *Cassia floribanda*, *Casia hirsute* and *Dalbergia retusa* etc.

**Keywords:** Antiparkinsonism, L-dopa, alternative medicine, herbs.

**Introduction**

Parkinson’s disease is a degenerative neurological disease affecting about 1% of the world population over 65 years
of age\(^1\). In Parkinson’s disease, nigrostriatal dopamine degeneration occurs\(^2\). Parkinson’s disease is characterized by the presence of tremor, muscular rigidity, bradykinesia, difficulty in balance and walking, depression and dementia\(^4\). As per historical evidence, Parkinson’s disease existed in ancient India and was called kampavata\(^2\). The disease acquired its present name from James Parkinson who described the disease in 1817 AD\(^5\).

Allopathic medicine such as L-Dopa is the drug of choice in the treatment of Parkinsonism and has adverse effects including gastro intestinal side effects such as vomiting, nausea, giddiness\(^3\) and orthostatic hypotension abnormal movements, behavioural adverse effect, end of dose deterioration or the on-off phenomenon with motor complications synonymous with the disease itself\(^4,1\). To overcome the adverse effects associated with allopathic medicine alternative medicines are preferred.

**Herbal therapy**

1. **Mucuna pruriens (MP):** Mucuna Pruriens commonly known as velvet beans (or) co-witch is used in case of spasms associated with Parkinsonism (or) Bell’s palsy\(^3\). L-Dopa is extracted from various mucuna seeds which have reported the yield of L-dopa as 1.9% where as a simple hot water extraction method that gave excellent recovery of L-Dopa (3.1-6.1%) from the seeds of nine species of mucuna\(^5\). MP extract showed twice the anti-parkinson’s activity, compared with synthetic L-Dopa in including CLR in the Parkinsonian animal model MP extract has been reported to contain unidentified antiparkinsonian compounds in addition to L-Dopa (or) adjuvant responsible to enhance the efficacy of L-Dopa\(^4\). On quantitative evaluation, MP had a quick onset of action and significantly more active than L-dopa\(^6\).

2. **Ginkgo biloba:** The neuroprotective effects of a standardized extract of Ginkgo biloba were investigated on 6-hydroxy dopamine (6-OHDA) induced neurotoxicity in the nigrostriatal dopaminergic system of the rat brain. A significant improvement was observed in rats that were treated with higher doses of Ginkgo biloba (100mg/kg daily) than in those treated with lower doses (50mg/kg) (or) with vehicle. It indicates a possible role for the extract in the treatment of Parkinson’s disease\(^7\).

3. **Vicia faba:** In 1913, Guggenheim first isolated dihydroxy phenylalanine in its levorotatory form from the extracts of Vicia faba beans. Recent studies have established the dose-response L-Dopa absorption characteristics of Vicia faba. In single-dose studies researchers have evaluated patients with pronounced “on - off” motor oscillations for the beneficial effect\(^3\).

4. **Vitex negundo:** Petroleum ether, n-butanol extracts of roots of (Vitex negundo) produced moderate CNS depression in experimental albino mice. Laboratory studies showed that butanol and ethanolic extracts produced marked antiparkinsonian effect\(^8\).
5. **Acantho panax senticosus** (ASH): A single dose administration of the plant extract elevated the nor-adrenaline and dopamine level in the whole brain of rats in a dose dependent manner. A single (or) 2 weeks administration of ASH (500mg/kg) showed a marked increase in Dopamine level in the striatum and antiparkinsonian activity.

6. **Ginseng**: Neuroprotective action of the ginseng extract was examined in two rodent animal models in Parkinson’s disease. Ginseng recently demonstrated to possess neuromotective properties which may be useful in preventing various forms of neuronal cell loss including the nigrostriatal degeneration seen in Parkinson’s disease.

7. **Plumbago zeylanica**: 50% ethanol extract of the root of *Plumbago zeylanica* specifically enhanced the spontaneous ambulatory activity without inducing stereotypic behaviour. It shows elevated levels of dopamine in striatum compared with the control rats brain.

8. **Female Palm of Borassus flebellifer**: Aqueous and ethanolic extract prepared from the plant and aqueous infusion prepared from the roots of female palm did not show the anti Parkinson’s activity in mice animal model.

9. **Catechins**: Five types of catechins showed different effects.

### Table 1: **Plants reported to contain L-Dopa**.

| Plant                     | Plant part | L-Dopa (%) | Ref. |
|---------------------------|------------|------------|------|
| Alysicarpus rugosus       | Seed       | 0.65       | 5    |
| Bauhinia purpurea         | Seed       | 2.2        | 5    |
| Bauhinia racemosa         | Seed       | 0.73       | 4    |
| Canavalia ensiformis      | Seed       | 2.46       | 4    |
| Canavalia gladiata        | Seed       | 2.13       | 5    |
| Cassia floribunda         | Seed       | 1.1-1.9    | 5    |
| Cassia hirsute            | Seed       | 2.37-2.82  | 4    |
| Dalbergia retusa          | Seed       | 2.2        | 4    |
| Glycine wighti            | Seed       | 0.2        | 5    |
| Mucuna andreana           | Seed (excluding seed coat) | 6.3-8.9 | 6    |
| Mucuna aterrima           | Seed       | 3.31       | 6    |
| Mucuna aterrima (black)   | Seed       | 4.2        | 5    |
| Mucuna birdwoodina tutcher| Seed       | 9.1        | 14   |
| Mucuna cochinchnensis.    | -          | 0.96       | 5    |
| Mucuna cochinchnensis.    | Seed(ash)  | 4.2        | 6    |
|                          | Pericarp(ash) | 0.14     |      |
|                          | Leaf(ash)   | 0.18       |      |
| Plant Species                        | Part                  | Ash Weight (g) | Reference |
|-------------------------------------|-----------------------|----------------|-----------|
| Mucuna cochinensis                  | Seed (grey)           | 205            | 5         |
| Mucuna cochinensis                  | Seed                  | 3-4            | 6,13      |
| Mucuna deeringiana                  | Seed                  | 2.7-3.13       | 14,6      |
| Mucuna gigantean                    | Seed                  | 1.50-3.78      | 5,14      |
| Mucuna holtonii                     | Seed                  | 6.13-7.5       | 14,13     |
| Mucuna monosperma                   | Seed                  | 4.24-4.56      | 6         |
| Mucuna mutisiana                    | Seed                  | 3.9-6.8        | 5         |
| Mucuna pruriens                     | Seed (excluding seed coat) | 5.9-6.4       | 13        |
| Mucuna pruriens                     | Seed                  | 1.25-9.16      | 5         |
| Mucuna pruriens                     | Seed (black.)         | 3.8            | 6         |
| Mucuna pruriens                     | Pericarp              | 0.09-0.22      | 12        |
| Mucuna pruriens                     | Leaf                  | 0.35           |           |
| Mucuna pruriens                     | Stem                  | 0.31           |           |
| Mucuna pruriens                     | Root                  | 0.16           |           |
| Mucuna pruriens var. utilis         | Whole bean            | 4.02           | 12        |
| Mucuna pruriens var. utilis         | Endocarp              | 5.28           |           |
| Mucuna pruriens f. hirsute          | Seed                  | 1.4-1.5        | 4,13      |
| Mucuna pruriens f. utilis           | Seed                  | 1.8            | 4         |
| Mucuna pruriens var. utilis         | White (Whole seed)    | 4.96           | 4,12      |
| Mucuna pruriens var. utilizes       | Seed (White)          | 6.08           | 13        |
| Mucuna pruriens var. utilizes       | Seed (spotted)        | 3.6            | 6         |
| Mucuna pruriens var. utilizes       | Pericarp              | 0.16           |           |
| Mucuna pruriens var. utilizes       | Leaf                  | 0.17           |           |
| Mucuna pruriens var. utilizes       | Stem                  | 0.19           |           |
| Mucuna pruriens var. utilizes       | Root                  | 0.12           |           |
| Mucuna sloanei                      | Seed                  | 3.34-9.0       | 5,13      |
| Mucuna sp                            | Seed                  | 1.96-4.96      | 6         |
| Mucuna urens.                       | Seed                  | 4.92-7.4       | 4,5       |
| Parkinsonia aculeate                | Seed                  | 0.64           | 5,13      |
| Phanera vahlii.                     | Seed                  | 2.35           | 5         |
| Pileostigma malabarica.             | Seed                  | 2.13           | 5         |
| Prosopis chilensis                  | Seed                  | 1.25           | 5         |
| Abstract Park neurone in the ageing cerebellum | Seed | 5 | |
| Green peel of pod                   |                       | 0.2-0.75       | 5         |
| Flowering green plant               |                       | 0.09           |           |
| Green seeds                         |                       | 0.006-0.01     |           |

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| Plant Name                        | Part Description                      | L-dopa Level |
|----------------------------------|---------------------------------------|--------------|
| Vicia faba var minor             | Dry seed                              | 0.07         |
|                                  | Green pods (whole unripe fruit)       | 0.60         |
|                                  | Green plant with pods                 | 0.56         |
|                                  | Green flowering plant                 | 0.40-0.46    |
|                                  | Green vegetative plant                | 0.24-0.57    |
| Vicia narbonensis.               | Green pods (peel only)                | 0.5          |
|                                  | Green plant with pods                 | 0.6          |
| Vigna aconitifolia.              | Seed                                  | 0.20         |
| Vigna unguiculata.               | Seed                                  | 0.45         |
| Vigna vexillata.                 | Seed                                  | 0.52-0.58    |

**Conclusion:**

The presence of L-dopa which was previously thought to be available only in Mucuna and Vicia is also isolated from many other plants beyond these two genera. Besides these two genera, other plants like Phanera, Pileostigma, Cassia, Canavalia, Dalbergia etc also have the principles that can be exploited for the production of L-dopa. However, higher amount of L-dopa is noticed only in Mucuna species. A systemic screening of these plants may provide an alternative to synthetic L-dopa opening new avenues for herbal cultivation and therapies.

**References:**

1. Walker R, Edwards C. Clinical pharmacy and therapeutics. 2003, 3, 483-493
2. Manyam, http://www.parkinson.org/beans.htm
3. Kusum Devi V, Shama Devi K, Shaikh SK. Plant based medications for Parkinsonism. Phamratimes, 2004, 86, 41-45.
4. Hussain G, Manyam BV. Mucuna pruriens more effective than L-dopa in Parkinson’s disease animal model. Phy. Ther. Res, 1997, 11(6), 419-423.
5. Krishnan Marg KS. L-dopa bearing plants. Nat. Prod. Rad. 2003, 2(3), 126-133.
6. Rajendran V, Joseph T, David J. Reappraisal of dopaminergic aspects of M. Pruriens and comparative profile with L-dopa on cardiovascular and CNS in animals. Indian drugs. 1996, 33(9), 465-472.
7. Kim MS, Lee JJ, Kim SE. Neuroprotective effect of Ginkgo biloba leaf extract in a rat model of Parkinson’s disease. Phy.ther.Res.2004, 18(8), 663-666.

8. Ravishanker B, Bhaskaran Nair R, Sasikala CK. Pharmacology of Vitex negudo root. Journal of Res.Ayur.Siddha.1986, 7(1-2), 62-77.

9. Fujikawa T, Soya H, Hibasami H, Kawashima H, Takeda H, Nishibes Nakashima K. Effect of Acanthopanax Senticosus harms on bipgenic monoamine levels in the rat brain. Phy.ther.Res.2002, 16(5), 474-478.

10. Ravishanker B, Makwana HG, Nair RB, Vijayan NP, Sasikalas CK, Saraswathi VN, Sulochana S. Some pharmacological studies on female palm of Borassus flabellifer. Journal of Res. Ayur. Siddha. 1989, 10(1-2), 75-86.

11. Jin CF, Shen SR, Zhao BI. Different effects of five catechine on 6-OHDA-induced apoptosis in PC12 cells. Journal of Agri. and food chem.2001, 49(12), 6033-6038.

12. Mahanjani SS, Doshi VJ, Parikh KM, Manyam BV. Bioavailability of L-dopa from HP-200. Phy.ther.Res. 1996, 10, 254.

13. Misra L, Mishra HO, Wagner H. Biologically active principles from Mucuna pruriens seeds. IUPAC international conference on biodiversity and natural products chemistry and medicinal applications.2004, 26-31, 213.

14. Ashok DB, Vadiya. The status and scope of Indian medicinal plants acting on CNS. Ind. J. Pharmacol. 1997, 29(5), 5340-5343