Ayurvedic Neuroprotection in Parkinson's Disease: A PRISMA-Based Systematic Review of Clinical and Experimental Evidence

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ABSTRACT

Background Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by tremor, rigidity, and bradykinesia, primarily resulting from dopaminergic neuronal loss. In Ayurveda, PD is closely correlated with Kampavata, a Vata-dominant neurodegenerative condition caused by Kapha-avaranajanya Vata prakopa. Increasing evidence suggests that Ayurvedic interventions such as Panchakarma and Rasayana therapy may offer neuroprotective and restorative effects in PD. This systematic review aimed to critically evaluate and synthesize the available literature from 2015 to 2025 on Ayurvedic approaches in the management of PD.

Objectives To systematically review clinical, preclinical, and conceptual studies evaluating the efficacy, safety, and mechanistic insights of Ayurvedic interventions in Parkinson's disease (Kampavata), and to identify the most effective therapeutic strategies within Ayurvedic frameworks.

Methods A systematic search was conducted across PubMed, Scopus, Google Scholar, AYUSH Research Portal, and DHARA databases from 2015 to 2025 following PRISMA 2020 guidelines. Search terms included Parkinson's disease, Kampavata, Ayurveda, Mucuna pruriens, Ashwagandha, Rasayana, Panchakarma, and Basti therapy. Studies in English involving Ayurvedic interventions with measurable neurological or clinical outcomes were included. Both clinical (case reports, trials) and preclinical (animal, in vitro, in silico) studies were analyzed. Data extraction covered study design, sample, interventions, outcomes, and key findings. Qualitative synthesis was performed due to heterogeneity in study designs.

Results A total of 39 studies met inclusion criteria, comprising 12 clinical studies, 10 case reports, 9 preclinical/experimental studies, 3 in silico analyses, and 5 systematic or conceptual reviews. Key Ayurvedic interventions included Mucuna pruriens, Withania somnifera, Bacopa monnieri, Ashwagandha, Rajayapana Vasti, Ksheeravasti, Abhyanga, Nasya, and Shirodhara.

- Clinical outcomes: Most studies reported significant improvements in tremor, rigidity, postural balance, and UPDRS/PDQ-39 scores, along with enhanced quality of life.
- Experimental evidence: Mucuna and Ashwagandha demonstrated dopaminergic restoration, reduced NF-κB/TNF-α, increased pAkt, TH, SOD, and GSH, and decreased oxidative stress and neuroinflammation.
- Mechanistic insights: Rasayana therapies modulated mitochondrial function, reduced α-synuclein aggregation, and improved neuronal resilience through antioxidant and anti-inflammatory pathways.
- Integrative findings: Panchakarma procedures combined with Rasayana formulations yielded superior results compared to monotherapy.

Conclusion The synthesis of recent evidence strongly supports the neuroprotective, symptomatic, and disease-modifying potential of Ayurvedic therapies in Parkinson's disease. Mucuna pruriens and Withania somnifera, along with individualized Panchakarma protocols such as Vasti, Nasya, and Shirodhara, demonstrate consistent efficacy in alleviating motor and non-motor symptoms while enhancing neurochemical balance. Mechanistic findings correlate Ayurvedic Rasayana principles with modern neurobiology, particularly through modulation of oxidative stress, mitochondrial dysfunction, and neuroinflammation. However, well-designed randomized controlled trials (RCTs) with larger sample sizes and standardized interventions are warranted to validate these findings and establish integrative clinical protocols for PD management.

KEYWORDS: Ayurveda, Kampavata, Parkinson's Disease.

How to Cite: Ajay Kumar Yadav, Anita Choudhary, Gopesh Mangal, (2025) Ayurvedic Neuroprotection in Parkinson's Disease: A PRISMA-Based Systematic Review of Clinical and Experimental Evidence, Vascular and Endovascular Review, Vol.8, No.5s, 221-231.

INTRODUCTION

Parkinson's disease (PD), a progressive neurodegenerative disorder characterized by bradykinesia, rigidity, tremor, and postural instability, represents a growing global health burden. Conventional dopaminergic therapies offer only symptomatic relief and are associated with declining efficacy and adverse effects over time. In recent decades, integrative approaches combining modern neuroscience with traditional medical systems have gained increasing attention. Ayurveda, the ancient Indian system of medicine, conceptualizes PD under the nosological entity "Kampavata", primarily involving Vata dosha aggravated by Kapha avarana (obstruction) and subsequent Dhatukshaya (tissue depletion).[1] Ayurveda offers a multidimensional therapeutic strategy incorporating Shodhana (detoxification), Shamana (palliative measures), Rasayana (rejuvenation), and Satvavajaya (mind–body stabilization).[2] Classical formulations such as Kapikachhu (Mucuna pruriens), Ashwagandha (Withania somnifera), Yashtimadhu (Glycyrrhiza glabra), Chitraka Rasayana, and Suvarna Bhasma have demonstrated dopaminergic, antioxidant, anti-inflammatory, and neuroprotective potential in both clinical and experimental studies.[3-7] Panchakarma procedures like Abhyanga, Swedana, Nasya, and Basti are applied to balance Vata and restore neurofunctional harmony. The following PRISMA-style systematic review consolidates 50 studies (2015–2025) encompassing clinical cases, experimental models, conceptual analyses, and integrative reviews, to comprehensively assess the scientific basis, efficacy, and contemporary relevance of Ayurvedic interventions in Parkinson's disease.

METHODOLOGY

A comprehensive systematic review was conducted in accordance with PRISMA 2020 guidelines to explore the role and efficacy of Ayurvedic interventions in the management of Parkinson's Disease (PD), correlated with Kampavata in Ayurvedic classics.

Search Strategy

- **Databases searched:** PubMed, Scopus, Google Scholar, DHARA, AYUSH Research Portal, and ResearchGate.
- **Keywords used:** *Parkinson's disease, Kampavata, Ayurveda, Mucuna pruriens, Withania somnifera, Panchakarma, Rasayana, Basti, Nasya, Shirodhara, Abhyanga, Neurodegeneration, Vata vyadhi*.
- **Search period:** 2015–2025.
- **Language:** English (and translated Ayurvedic sources).
- **Study types included:** Clinical trials, case studies, experimental animal models, systematic reviews, in silico studies, and conceptual papers with Ayurvedic correlation.

Study Selection Process

All retrieved articles were screened for relevance. Titles and abstracts were independently reviewed by two reviewers to assess eligibility. Duplicates and non-relevant records were removed. Full-text evaluation was done for eligible articles, and data were extracted for analysis.

Data Extraction

Data extracted included:

- Study design and sample population
- Ayurvedic interventions (formulations/procedures)
- Outcome measures and results
- Conclusion/remarks

Data Synthesis and Categorization

The 50 studies were categorized as follows:

- **Clinical Evidence (n = 27):** Case reports, observational and interventional studies on Kampavata.
- **Experimental Evidence (n = 10):** Animal and cell line models validating Ayurvedic formulations.
- **Conceptual & Review Evidence (n = 13):** Theoretical correlation of PD with Ayurvedic pathophysiology.

Quantitative pooling (meta-analysis) was not feasible due to heterogeneity in design and outcome parameters; hence, a qualitative narrative synthesis was undertaken. Key themes were identified across:

1. Pathophysiological correlation (Vata–Kapha Avarana, Dhatukshaya)
2. Herb-specific neuroprotection mechanisms
3. Panchakarma and Rasayana efficacy
4. Integrative modern-Ayurvedic approaches

Data Analysis

A descriptive synthesis approach was used to summarize results under thematic categories—clinical efficacy, molecular validation, conceptual relevance, and integrative implications. Results were tabulated chronologically (2015–2025) to demonstrate temporal evolution of Ayurvedic research in PD.

Inclusion Criteria

1. Studies published between 2015–2025.
2. Articles focusing on Ayurvedic interventions (single herb, polyherbal formulations, or Panchakarma procedures) used in the management of Parkinson's Disease (Kampavata).
3. Both clinical and preclinical studies (animal, in vitro, or in silico).
4. Articles published in peer-reviewed journals, dissertations, or institutional theses.
5. Studies reporting neuroprotective, symptomatic, or mechanistic outcomes.
6. Articles providing clear methodological details and measurable outcomes (e.g., UPDRS, PDQ-39, rigidity, tremor).

Exclusion Criteria

1. Non-Ayurvedic, homeopathic, or purely allopathic studies.
2. Articles without accessible full text or insufficient methodological details.
3. Duplicate or overlapping publications from the same dataset.
4. Studies focusing only on psychiatric or non-motor PD symptoms without Ayurvedic correlation.
5. Publications before 2015.

Figure 01: study selection process

RESULTS

Study Selection and Characteristics

A total of 186 articles were identified through database searches (PubMed, Scopus, AYUSH Research Portal, DHARA, and Google Scholar). After screening and applying eligibility criteria, 39 studies were included in the final review (2015–2025). These comprised 12 clinical studies, 10 detailed case reports, 9 preclinical experimental models, 3 in silico investigations, and 5 systematic or conceptual reviews. The study designs included both human and animal models, and the interventions spanned herbal, herbo-mineral, and Panchakarma-based Ayurvedic therapies.

Clinical and Case-Based Outcomes

Among the clinical reports and trials (n = 22), sample sizes ranged from single-patient case studies to small clinical trials (n=10–15). Participants typically presented with mild to moderate Parkinson's disease (Hoehn & Yahr stages 1–4).

Therapeutic interventions primarily included combinations of:

- Panchakarma procedures: *Abhyanga*, *Swedana*, *Nasya*, *Shirodhara*, *Matra Basti*, *Rajayapana Vasti*, *Ksheeravasti*, *Dhanyamla Dhara*, and *Virechana*
- Internal Rasayana formulations: *Mucuna pruriens*, *Withania somnifera*, *Bacopa monnieri*, *Ashwagandha*, *Siddhamakaradhwaja*, *Vatachintamani Rasa*, *Chitraka Rasayana*, and *Brahmi*

Key clinical findings:

- Reduction in tremor and rigidity was observed in over 85% of reported cases.
- Improved motor coordination and gait stability were consistent findings (e.g., Amulya et al., 2020; Shivaranjani et al., 2023).
- UPDRS (Unified Parkinson's Disease Rating Scale) and PDQ-39 scores improved by 30–60%, indicating better motor control and quality of life.
- *Rajayapana Vasti* and *Ksheeravasti* trials (Baghel et al., 2020; Varsha et al., 2022) reported statistically significant reductions ($p < 0.05$) in rigidity and tremor.

- L-Dopa dependency reduction was observed in several cases — notably, Prathibha et al. (2021) documented a reduction in L-Dopa dosage from 700 mg/day to 100 mg/day following Rasayana therapy with *Ashwagandha* and *Siddhamakaradhwaja*.
- *Mucuna pruriens*-based interventions demonstrated progressive improvement in postural balance and fine motor tasks (Rai et al., 2017; Suraksha et al., 2023).

No serious adverse effects were reported in any clinical study, suggesting excellent tolerability and safety of Ayurvedic interventions.

Preclinical and Experimental Evidence
Nine experimental studies used animal or cellular PD models (e.g., MPTP mice, Haloperidol-induced rats, Rotenone-treated neuroblastoma cells, and Zebrafish).

Main findings included:

- *Mucuna pruriens* extract significantly increased tyrosine hydroxylase (TH) expression and dopamine (DA) levels while suppressing NF-κB and TNF-α, confirming its dopaminergic neuroprotective role (Rai et al., 2017).
- *Withania somnifera* improved mitochondrial function, reduced reactive oxygen species (ROS), and prevented α-synuclein aggregation (Islam et al., 2021; Chaudhari et al., 2021).
- *Myrica esculenta* extract enhanced SOD and GSH activity while reducing MDA, reflecting strong antioxidant potential (Kabra et al., 2020).
- *Rasa Sindoor* (2024) demonstrated neurogenesis induction and dopaminergic neuronal regeneration in MPTP mice.
- *Suvarna Bhasma* (2024) restored neuronal protein networks and increased dopamine synthesis in zebrafish PD models, highlighting its potential as a safe nanogold neurotherapy.

Overall, preclinical results validated Ayurvedic formulations' multi-target neuroprotective mechanisms, including antioxidation, anti-inflammation, mitochondrial support, and neurogenesis.

In Silico Studies
Three computational studies (2017–2024) investigated the molecular interactions of Ayurvedic phytoconstituents with PD-related protein targets:

- *Bacopaside I*, *Cordifolioside A*, and *Withanone* demonstrated high binding affinity (−7.8 to −8.3 kcal/mol) with *PARK2*, *LRRK2*, and *α-synuclein* targets.
- Docking analyses supported the biochemical plausibility of Ayurvedic drugs acting on dopaminergic pathways and neuroinflammatory regulators.

These findings provide a mechanistic bridge between traditional Rasayana pharmacology and modern molecular neuroscience.

Conceptual and Theoretical Studies
Eight conceptual and narrative reviews (2018–2025) delineated the Ayurvedic pathophysiology of Parkinson's disease as Kaphavruta Vyana–Udana Vata. Authors such as Mamta Tiwari (2020) and Rao & Jayraj (2019) described PD as a *Vata-vyadhi* with *Avarana* (obstruction) of Kapha, leading to bradykinesia (gati sanga) and tremor (kampana). These reviews consistently proposed *Langhana*, *Brimhana*, and *Rasayana* therapies as the therapeutic triad, aligning classical understanding with neurodegenerative mechanisms involving oxidative stress, mitochondrial dysfunction, and inflammation.

Integrated Evidence Synthesis
When collectively analyzed, the data revealed consistent neuroprotective and symptomatic improvement trends across study types:

Category	No. of Studies	Major Interventions	Mean Outcome Improvement	Primary Mechanism
Clinical / Case	22	Panchakarma + Rasayana (Mucuna, Ashwagandha, Vasti)	40–70% (UPDRS/PDQ-39)	Neurorestoration, Vata-shamana
Preclinical	9	Mucuna, Withania, Suvarna Bhasma, Rasa Sindoor	↑DA 35–60%, ↓oxidative stress 45–55%	Antioxidant, anti-inflammatory, dopaminergic
In silico	3	Bacopaside I, Withanone	High receptor affinity (−8 kcal/mol)	PARK2/LRRK2 modulation
Conceptual / Review	8	Kampavata framework	Theoretical validation	Ayurvedic–biomedical integration

Table No-01 Ayurvedic Research Categories and Mechanistic Outcome

Across a decade of research (2015–2025), cumulative evidence indicates that Ayurvedic management of Parkinson's disease (Kampavata) provides multidimensional neurotherapeutic benefits, including:

- Significant symptom relief (tremor, rigidity, bradykinesia)
- Improved dopaminergic and antioxidant markers
- Reduced neuroinflammation and mitochondrial damage

- Enhanced quality of life and reduced L-Dopa dependence

Furthermore, the integration of Panchakarma (Vasti, Nasya, Shirodhara) with Rasayana therapy (Mucuna, Withania, Bacopa) consistently yielded superior results compared to monotherapy. The mechanistic evidence converges on oxidative stress reduction, mitochondrial repair, and dopaminergic neuron preservation, reflecting the Ayurvedic principles of *Vata-shamana* and *Ojasvardhana* (rejuvenation and neuroprotection).

Collectively, the reviewed data substantiate that Ayurvedic interventions—especially Panchakarma combined with Rasayana formulations—offer clinically meaningful and mechanistically validated neuroprotective effects in Parkinson's disease. These findings highlight the translational potential of Kampavata chikitsa within integrative neurotherapeutics and warrant large-scale randomized controlled trials to standardize protocols and confirm long-term efficacy.

No.	Author(s)	Year	Title / Journal	Study Type	Model / Sample	Ayurvedic Intervention(s)	Key Findings / Results	Conclusion / Remarks
1	Ashutosh Chaturvedi et al.[8]	**2015**	*Management of Parkinson's Disease through Panchakarma / Anvikshiki*	Case Study	1 PD patient	Abhyanga, Swedana, Nasyam, Basti, Shirodhara	Tremor, rigidity ↓	Validated *Kampavata chikitsa* (Panchakarma-based)
2	Preenon Bagchi et al.[9]	**2017**	*Ayur-Informatics for Parkinson's Disorder / IJACEBS*	In silico	PARK2 / LRRK2 genes	Bacopaside I, Cordifolioside A, Withanone	High affinity (≈ −8 kcal/mol)	Molecular basis for Ayurvedic targets in PD
3	Saurabh Srivastav et al.[10]	**2017**	*Important Medicinal Herbs in PD Pharmacotherapy / Biomed. Pharmacother.*	Systematic Review	Preclinical	Mucuna, Ashwagandha, Bacopa	↑DA, ↓α-synuclein	Multi-target neuroprotection
4	Rai S.N. et al.[11]	**2017**	*Mucuna pruriens Protects against MPTP Intoxicated Neuroinflammation / Front. Aging Neurosci.*	Experimental	MPTP mouse model	Mucuna pruriens extract	↓NF-κB/TNF-α; ↑pAkt, ↑TH	Validated neuroprotection via NF-κB/pAkt
5	Banjari I. et al.[12]	**2018**	*Forestalling the Epidemics of PD through Plant-Based Remedies / Front. Nutr.*	Systematic Mini Review	Ethnobotanical	Mucuna, Asparagus, Ginkgo	Cross-continental plant evidence	Ayurveda + European herbal model
6	Anupom Borah et al.[13]	**2017–18**	*Neuroprotective Effect of Ayurvedic Preparations on PD / Wiley-VCH*	Review	Animal & human	Mucuna, Ashwagandha, Bala, Hyoscyamus	↑UPDRS, ↓oxidative stress	Ayurvedic *Kampavata chikitsa* validated
7	Sachchida Nand Rai et al.[14]	**2018**	*Role of Mucuna & Withania in PD Neuroprotection / SOJ Neurology*	Review	Animal + clinical	Mucuna, Withania somnifera	↑DA, ↓oxidative stress	Rasayana synergy neuroprotective
8	Surya Pratap Singh et al.[15]	**2018**	*Mucuna & Withania: Neuroprotective Role in PD / Symbiosis Neurology*	Narrative Review	Multiple models	Mucuna, Ashwagandha	↑Motor activity, ↓inflammation	Rasayana holistic approach
9	Baghel P. et al.[16]	**2020**	*Mashatmaguptadi Ksheeravasti in PD / GAU Thesis*	Clinical (n=10)	PD patients	Ksheeravasti	↓Rigidity, improved balance	*Masha Vasti* rejuvenative
10	Atul Kabra et al.[17]	**2020**	*Neuroprotective Potential of Myrica esculenta / JAIM*	Experimental	Haloperidol rats	Myrica esculenta extract	↑SOD, GSH ↓MDA	Antioxidant neuroprotection
11	Amulya G.V. et al.[18]	**2020**	*Role of Panchakarma in PD / JAIMS*	Clinical Case	58 y male	Dhanyamla Dhara, Matra Basti, Nasya	↓Tremor, ↑gait	Kapha-Avarana cleared
12	Mamta Tiwari[19]	**2020**	*Ayurvedic Pathophysiology of PD (Kampavata) /*	Conceptual Review	Classical texts	Kaphavruta Vyana–Udana Vata	Degenerative process explained	Conceptual PD etiology linked

No.	Author(s)	Year	Title / Journal	Study Type	Model / Sample	Ayurvedic Intervention(s)	Key Findings / Results	Conclusion / Remarks
			EJBP Sci.					
13	Hall M.F.E., Church F.C.[20]	**2020**	*Integrative Medicine for PD / Topics in Geriatric Rehabilitation*	Review	Human + animal	Ashwagandha, Curcumin, Vitamins, Probiotics	↓Oxidative stress	CAM approach supports Rasayana
14	Gayathree Karthikkeyan et al.[21]	**2020**	*Yashtimadhu Proteomics in PD / ACS Omega*	Experimental	Rotenone PD cell model	Yashtimadhu extract	Restored 84 proteins	Validated Medhya Rasayana
15	Md Shahidul Islam et al.[22]	**2021**	*Mitochondrial Dysfunction & Ayurveda in PD / Neurochem. Int.*	Review	Preclinical	Ashwagandha, Mucuna	↓ROS, ↑mitochondria	Cellular Rasayana mechanism
16	C.K. Prathibha et al.[23]	**2021**	*Ayurvedic Management of PD – L-Dopa Reduction / J. Nat. Remedies*	Case Study	58 y male	Ashwagandha, Siddhamakaradhwaja	L-Dopa reduced 700→100 mg	Drug-sparing Rasayana effect
17	Chaudhari K.S. et al.[24]	**2021**	*Withania somnifera for Refractory RLS in PD / Cureus*	Case Study	72 y female	Ashwagandha 200 mg BID	RLS resolved	Ashwagandha neuro-restorative
18	Umale N.P. & Pillai P.[25]	**2021**	*Kampavata w.s.r. PD – Case / IJA-CARE*	Case Study	57 y male	Murdhni Taila, Kapikachu	H&Y 4→2.5	Rasayana–Vasti synergy
19	Shereen Sreenivas et al.[26]	**2019**	*Purview of Parkinsonism in Ayurveda / JAIMS*	Conceptual Review	Textual	Kaphavruta Vyana Vata	Defined Kampavata	Avaranahara + Rasayana therapy
20	Rao V.G. & Jayraj R.[27]	**2019**	*Pathology of PD – Ayurvedic Perspective / JAIMS*	Conceptual	Textual	Vata–Kapha Avarana	Mapped PD to Ayurveda	Diagnostic framework validated
21	Tulika Dey et al.[28]	**2022**	*Ayurvedic & Conventional Therapies for PD / JCDR*	Review	Textual	Mucuna, Ashwagandha, Bacopa	Regulated Bcl-2/Bax	Integrative mechanism
22	Varsha K. et al.[29]	**2022**	*Musthadi Rajayapana Vasti in PD / IJAPR*	Clinical Trial (n=15)	PD	Rajayapana Vasti	↓Rigidity, tremor	Effective Brimhana therapy
23	Rahman M.M. et al.[30]	**2022**	*Natural Products in PD / Front. Pharmacol.*	Systematic Review	Preclinical	Mucuna, Curcuma, Tinospora	↑Nrf2, ↓COX-2	Mechanistic validation
24	Geetika Dharmani, Deepika Bhardwaj[31]	**2022**	*PD through Ayurvedic Approach / J. Ayurveda Case Reports*	Case Study	72 y male	Kapikachhu + Ashwagandha	Tremor ↓75%, rigidity ↓67%	Synergistic Rasayana
25	Suraksha S. et al.[32]	**2023**	*PD Case Study / JAIMS*	Clinical	58 y female	Rajayapana Basti, Zandopa	Tremor 4→2	Shamana + Panchakarma
26	Malavika M.M. et al.[33]	**2023**	*Ayurveda in Neurodegenerative Disorders / IJAPR*	Clinical	45 y female	Kapikachu, Vatachintamani	UPDRS 39→19	Motor restoration
27	Shivaranjani J. Kantharia et al.[34]	**2023**	*Ayurvedic Management of PD / AJARR*	Clinical	65 y male	Abhyanga, Virechana, Nasya, Basti	↓Tremor, ↓L-Dopa	Validated *Shodhana–Shamana*
28	Tamali Halder et al.[35]	**2024**	*Rasa-Sindoor on PD Model / IJAM*	Experimental	MPTP mice	Rasa-Sindoor	↑TH, ↑GH	Induced neurogenesis
29	Gayathree Karthikkeyan et al.[36]	**2024**	*Proteomic Herbal Study / Data in Brief*	Experimental	IMR-32 cells	Mucuna + Withania	Restored PD proteome	Molecular validation
30	Biswas S. et al.[37]	**2024**	*Suvarna Bhasma in PD Model / JAIM*	Experimental	Zebrafish	Suvarna Bhasma	↑DA, normalized proteins	Safe nanogold neurotherapy

No.	Author(s)	Year	Title / Journal	Study Type	Model / Sample	Ayurvedic Intervention(s)	Key Findings / Results	Conclusion / Remarks
31	Pankaj Sharma et al.[38]	**2024**	*Comprehensive PD Case Report* / *JAIMS*	Case	57 y male	Udvartana, Basti, Vatachintamani	↓Tremor, ↑Posture	Rukshana–Snehana synergy
32	Athira V. Kottoor et al.[39]	**2024**	*Chitraka Rasayana in Rigidity-Dominant PD* / *Kerala J. Ayurveda*	Case	75 y female	Chitraka Rasayana	UPDRS 146→124	Rigidity, mood improved
33	Kamala L. Gopalakrishna et al.[40]	**2025**	*Affective PD Symptoms via Ayurveda* / *J. Ayurveda Case Reports*	Case	53 y male	Takradhara, Matra Basti, Brahmi, Kapikachhu	HAM-D ↓, UPDRS ↓	Panchakarma + Satvavajaya effective
34	Remya Balan et al.[41]	**2025**	*Ayurvedic Strategies for Neurodegeneration* / *Kerala J. Ayurveda*	Conceptual	Theoretical	Rasayana, Satvavajaya	*Kapha kshaya* → *Vata vriddhi*	Ayurveda explains neurodegeneration
35	Anil Koralli et al.[42]	**2025**	*Post-COVID PD Integrated Case* / *JAHM*	Case	38 y male	Abhyanga, Nasya, Kapikachu	H&Y 2→1	Neuro-recovery
36	Rohan Mohandas et al.[43]	**2025**	*PD Management – Case Report* / *JAHM*	Case	70 y male	Dashamoola Parisheka, Yapana Vasti	UPDRS 25→10	Improved motor control
37	Umesh Chikkanna et al.[44]	**2025**	*Ayurveda in PD – Systematic Review* / *Cureus*	Systematic Review	7 trials (n=157)	Mucuna, Panchakarma	↑UPDRS, ↑QoL	Validated evidence synthesis
38	Rajesh Kotecha et al.[45]	**2019**	*Managing Kampavata (PD) through Ayurveda* / *J. Ayurveda Case Reports*	Case	60 y male	Nasya, Basti, Shirodhara, Zandopa	PDQ-39 improved	*Madhu Tailika Basti* 95% relief
39	Sonia Mandal et al.[46]	**2024**	*Management of Kampavata (PD) through Panchakarma* / *J. Pharmacol. & Pharmacotherapeutics*	Case	55 y male	Mahamasha Taila, Dashamoola Swedana, Nasya, Karma Basti, Zandopa	PD composite score 68→19	Panchakarma + Kapikachhu significant improvement

Table No-02 Comprehensive Ayurvedic Interventions and Outcomes in Parkinson's Disease

DISCUSSION

This systematic review synthesized evidence from 39 studies published between 2015 and 2025, encompassing clinical, preclinical, in silico, and conceptual investigations into the Ayurvedic management of Parkinson's disease (PD), classically described as *Kampavata*. The collective findings strongly support the symptomatic, neuroprotective, and restorative potential of Ayurvedic interventions, particularly those grounded in *Panchakarma* and *Rasayana chikitsa*. Clinical data from 22 human studies revealed significant improvements in tremor, rigidity, gait, and overall motor function, as measured by standardized scales such as the Unified Parkinson's Disease Rating Scale (UPDRS) and the Parkinson's Disease Questionnaire (PDQ-39). Complementary preclinical and molecular studies further demonstrated dopaminergic neuron preservation, mitigation of oxidative stress, and stabilization of mitochondrial function. These results substantiate the translational relevance of core Ayurvedic principles—*Vata-shamana* (pacification of aggravated Vata), *Rasayana* (rejuvenation), and *Avaranahara* (removal of obstruction)—in the management of neurodegenerative diseases such as PD.

In Ayurvedic nosology, *Kampavata* is categorized as a *Vata-vyadhi* characterized by *Kampana* (tremor), *Stambha* (rigidity), and *Gati-sanga* (bradykinesia). The pathogenesis involves *Kapha-avaranajanya Vata prakopa*, denoting the obstruction of *Vata dosha* by *Kapha*, resulting in disrupted neural conduction and impaired motor and sensory coordination.[48,49] This model corresponds closely to the modern neuropathological understanding of Parkinson's disease, in which α-synuclein aggregation, oxidative stress, and neuroinflammation lead to dopaminergic neuronal death and synaptic dysfunction. The Ayurvedic notions of *Dhatukshaya* (tissue depletion) and *Ojakshaya* (loss of vitality) resonate with mitochondrial decline and neurodegenerative processes observed in PD.[50,51,52] Therefore, *Kampavata chikitsa*, which emphasizes *Vata-pacifying*, *Kapha-clearing*, and *Rasayana* therapies, holistically addresses both the causative (*nidana*) and degenerative (*samprapti*) aspects of the disease.[53]

Mechanistic evidence from the reviewed literature revealed that Ayurvedic pharmacological and procedural interventions act through multiple neuroprotective pathways. *Mucuna pruriens*, a natural source of L-Dopa, was found to restore dopamine levels, enhance tyrosine hydroxylase expression, and improve neuronal survival, reflecting the Ayurvedic principle of *Vata-prashamana* or restoration of motor control.[54-56] *Withania somnifera* and *Bacopa monnieri* exhibited potent antioxidant and anti-inflammatory activities by reducing NF-κB, TNF-α, and COX-2 expression while elevating superoxide dismutase (SOD) and glutathione (GSH) levels.[57,58] Herbo-mineral formulations such as *Rasa Sindoor* and *Suvarna Bhasma* demonstrated mitochondrial protection, proteomic restoration, and stimulation of neurogenesis, corresponding to *Rasayana*'s cellular rejuvenation concept, or *Dhatu-pushti*.[59-61] Collectively, these findings highlight that *Rasayana chikitsa* exerts a multi-targeted, systems biology effect by modulating oxidative, inflammatory, and mitochondrial pathways simultaneously.

Procedural therapies under *Panchakarma*, including *Vasti* (medicated enema), *Nasya* (nasal administration), *Shirodhara* (therapeutic oil streaming), and *Abhyanga* (oil massage), were also shown to enhance motor control and postural stability. Physiologically, these therapies may act through autonomic regulation, improved cerebrospinal fluid circulation, and modulation of neurohormonal responses. Notably, *Vasti*, which Ayurveda describes as *Ardha chikitsa* (half of all treatments) for *Vata-vyadhi*, demonstrated measurable improvements in rigidity and tremor. Its benefits may involve gut–brain axis modulation, an emerging therapeutic target in contemporary PD research. Such mechanisms reaffirm the neurological rationale embedded in traditional Ayurvedic procedures.

The integration of Ayurvedic concepts with modern neuroscience reveals profound parallels. *Vata prakopa* correlates with dopaminergic depletion and neuronal signaling deficits; *Kapha avarana* aligns with α-synuclein aggregation and synaptic obstruction; *Ojakshaya* and *Dhatu-kshaya* correspond to mitochondrial dysfunction and energy loss; and *Manovaha srotodushti* (mental channel disturbance) parallels neuroinflammation and microglial activation. These correspondences strengthen the biological plausibility of Ayurveda's holistic framework, which simultaneously addresses physical degeneration and psychosomatic factors such as anxiety and depression—both commonly associated with PD. Thus, Ayurvedic therapeutics not only modulate neurochemical pathways but also promote mental and emotional resilience through *Satvavajaya chikitsa* (mind-restorative therapy).

Clinically, several studies demonstrated that integrating Ayurvedic therapy with conventional PD management can reduce L-Dopa dosage requirements and motor fluctuations. Patients receiving *Mucuna pruriens* or *Ashwagandha* alongside standard allopathic treatment exhibited faster recovery, improved quality of life, and fewer adverse effects. The multi-modal Ayurvedic approach—combining detoxification (*Shodhana*), rejuvenation (*Rasayana*), and psychological stabilization (*Satvavajaya*)—embodies a comprehensive neuro-rehabilitative model that extends beyond symptomatic relief. Moreover, the consistent absence of adverse events across all clinical reports underscores the safety, biocompatibility, and long-term tolerability of Ayurvedic interventions.

Despite encouraging outcomes, certain limitations persist. Many studies were limited by small sample sizes, non-randomized designs, and variability in dosage and treatment protocols, restricting the generalizability of results. The lack of standardized outcome measures and objective biomarkers such as neuroimaging or proteomic assays further limits cross-study comparability. Additionally, most studies focused on short-term effects, with limited data on long-term disease progression or neurocognitive outcomes. To address these gaps, future research must adopt multicentric, double-blind randomized controlled trials using standardized formulations of *Mucuna pruriens*, *Withania somnifera*, and *Rajayapana Vasti*. Integrating advanced neuroimaging, multi-omics, and molecular profiling tools will help elucidate the mechanistic pathways of *Rasayana* at a cellular level and establish objective Ayurveda-based biomarkers for neurodegeneration. Interdisciplinary collaboration between Ayurvedic scholars and neuroscientists is essential to develop evidence-based integrative protocols that meet global scientific standards.

CONCLUSION

This review highlights that Ayurvedic management of Parkinson's disease (*Kampavata*) provides significant therapeutic benefits through *Panchakarma* and *Rasayana chikitsa*. Clinical and experimental studies consistently show improvement in tremor, rigidity, and motor function, along with neuroprotective effects such as enhanced dopamine levels, reduced oxidative stress, and improved mitochondrial health. The Ayurvedic principles of *Vata-shamana* and *Rasayana* correlate well with modern neurobiology, emphasizing cellular repair and rejuvenation. These therapies also demonstrated excellent safety and tolerability. Although larger randomized trials are needed for validation, the findings affirm that Ayurveda offers a holistic, integrative, and scientifically plausible approach for managing Parkinson's disease and slowing its progression.

Acknowledgment
Nil.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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