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REVIEW ARTICLE

Exploring Ayurvedic strategies- An in-depth examination of neurodegenerative diseases

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Abstract

Neurodegenerative diseases, including Alzheimer's and Parkinson's, represent a class of progressive disorders marked by the gradual decline of neuronal integrity and function, ultimately leading to cognitive and physical impairments. Conventional research has revealed critical molecular mechanisms driving these diseases, such as oxidative stress, protein misfolding and aggregation, mitochondrial dysfunction and chronic neuroinflammation. Despite advances in understanding these pathways, treatment remains largely symptomatic, focusing on delaying progression rather than addressing the underlying causes.

Ayurveda offers a unique perspective on neurodegenerative disease progression. It recognizes the early, subtle disruptions in the body's internal balance, or *dosha imbalance,* which, if unaddressed, manifest as more pronounced systemic effects over time. Ayurvedic therapies aim to restore this balance, support cognitive function and promote resilience through neuroprotective herbs, dietary modifications and *Rasayana* (rejuvenation therapies). These practices are thought to address disease both at the root level and across the body's systems, aligning with modern scientific findings on neuroprotection.

This article explores how Ayurvedic principles complement contemporary neuroprotective strategies by addressing early-stage molecular imbalances and providing a framework for preventive care. By focusing on maintaining *ojas* (vital essence) and balancing *doshas*, Ayurveda may offer an integrative model for managing neurodegeneration that supports not only symptomatic relief but also long-term resilience in neuronal health.

Introduction

Neurodegenerative diseases are progressive conditions characterized by the gradual loss of structure or function of neurons, ultimately leading to cell death. Disorders like Alzheimer's disease (AD) and Parkinson's disease (PD) are not only major causes of morbidity and mortality but also place substantial emotional and financial burdens on patients and healthcare systems worldwide.[1] Conventional research has significantly advanced the understanding of molecular mechanisms underlying neurodegenerative

diseases, such as the accumulation of amyloid-beta in Alzheimer's and the role of oxidative stress in Parkinson's disease. However, these approaches often focus on symptomatic treatment rather than prevention or treating the root cause. In contrast, Ayurveda, offers unique perspectives involving *Dosha* based assessment in accordance with the stage of the disease *using* neuroprotective herbs, dietary guidelines and *Rasayana* treatment (Rejuvenation) that align with modern therapeutic approaches. Ayurveda, with its focus on maintaining *Ojas*, balancing *Doshas* and promoting *Rasayana* therapies, potentially complements modern approaches by addressing the body and mind in unison. The review first, explores the molecular pathophysiology of neurodegenerative diseases, highlighting key mechanisms such as abnormal protein dynamics, oxidative stress and mitochondrial dysfunction. Next, it correlates these modern scientific findings with Ayurvedic concepts of *Dosha gunas* (qualities) and *Dosha* imbalance. Finally, the review analyses how Ayurvedic herbs by virtue of their *gunas* bring about neuroprotection. While previous reviews broadly address the Ayurvedic management of neurodegenerative diseases, this article explores the mechanistic understanding of their onset, progression and final manifestation-from cellular-level changes to the complete expression of symptoms-through an Ayurvedic perspective

Materials and methods

A literary review of the conceptual research was done by referring to various Ayurvedic classical texts to extract information regarding the main concept of neurodegeneration, analyzing its pathophysiology and pharmacotherapeutics based on *gunas*. Also, the review has been done following various research journals, scientific papers and internet sources.

Molecular and Cellular Pathways in Neurodegenerative Disease Progression

The symptoms of onset of neurodegenerative diseases is often unrecognizable, with cellular and molecular alterations accumulating over time. These changes, driven by factors like oxidative stress, abnormal protein aggregation, mitochondrial dysfunction and dysregulation in autophagy, progressively impair neuronal function and survival. Understanding these underlying mechanisms is crucial, as they form the foundation for both early detection and targeted therapeutic interventions in conditions such as Alzheimer's and Parkinson's disease. Some major contributors and their manifestations in neurodegenerative diseases are tabulated below:

Concept of Neurodegeneration in relation to Ayurveda

Neurodegenerative diseases are progressive conditions characterized by the gradual loss of structure and function of neurons, ultimately leading to cell death. Rather than viewing neurodegenerative diseases as an isolated disease, Ayurveda sees them as progressive imbalances in *doshas*, which start subtly at a molecular level and manifest gradually. In Ayurveda, the earliest stage of disease manifestation, known as *sanchaya* (accumulation), occurs subtly and often goes unnoticed. This aligns with the initial molecular changes in neurodegeneration, such as oxidative stress and protein misfolding. This stage of *sanchaya* gradually leads to imbalance in *doshas* expressing symptoms of the body and mind which increases with time. Neurodegenerative diseases reflect this idea, as cellular-level damage over time impacts larger neural networks, leading to cognitive and physical declines.[3]

Physiological concept of the nervous system in Ayurveda

Physiology of nervous system in Ayurveda helps in understanding the process of attaining knowledge and the *doshas* involved in the process.

A. *Jnana ulpathi* (Process of cognition)

The perception of knowledge occurs due to *sannikarsha* (sense-object affirmation or conjunction) between *Atma-manas-indriya-indriyartha* (object of sense organ). [9]

Table 1: Major contributors and their manifestations in neurodegenerative diseases [2]

Contributor	Manifestation
Abnormal Protein Dynamics	Disrupted protein synthesis, folding and degradation leads to aggregation of misfolded proteins such as beta-amyloid, tau and alpha-synuclein within neurons
Oxidative Stress	Oxidative stress contributes to lipid peroxidation, DNA damage and protein oxidation, exacerbating neuronal injury and death.
Mitochondrial Dysfunction	Impaired mitochondrial function leads to reduced energy output, increased ROS and disrupted calcium balance, contributing to cell death.
Abnormal Autophagy	Disrupted autophagic pathways lead to the accumulation of damaged proteins and organelles within neurons, exacerbating cellular stress and dysfunction
Disruption of Cellular and Axonal Transport	Disruptions in this system, often due to cytoskeletal defects or the presence of protein aggregates, impair neuronal function and lead to cell death.
Neuroinflammatory Mechanisms	Chronic neuroinflammation leads to prolonged activation of microglia and astrocytes leading to increased oxidative stress and neuronal damage

Table 2: *Angas* (Anatomical structures) and their role in nervous system

Anatomical structures	Role in nervous system
a. *Shiras* (Head)	*Uthamanga* (best among all organs) -seat of *pranah* (life force) and *sarva indriyas* (the sense organs) [4] Specifically said to be the seat of *kapha dosha*.[5]
b. *Masthulunga,Masthishka* (Brain)	*Masthishka* is *shirogata sneha* (unctuous part inside head) [6]. *Masthulunga* (brain) is "*avaleena ghritakara* (like solidified ghee)".[7] This supports the fact that *shiras* is the seat of *kapha dosha*.
c. *Indriyas* (organs of perception)	The seat of all *indriyas* (sense organs) is *shiras*[5] The transmission of signals from *jñānendriya* (sensory organs) to the brain through ***Manas*** (mind) is similar to the sensory transmission mediated by afferent neurons in modern neurophysiology. ***Karmendriyas*** (organs of action) execute responses based on the sensory input received and processed. The ***Atma***, through the mediation of ***Manas***, validates the information received by Indriyas, making it an experiential reality. This process mirrors the central nervous system's role in integrating sensory input into conscious perception.[8]

B. Physiology of *doshas* in the *shiras* (head)

Table 3: Tridoshas and their normal function in the nervous system

Doshas	Functions in nervous system
a. *Kapha dosha*	Maintains the body's structure, stability and lubrication Provides *snehana* (unctuousness), *sandhisamsleshana* (binds the body's components) and is *balakrit* (promotes strength) and *sthiryakrit* (sturdiness and disease resistance) etc. Psychologically, it enhances *kshama* (patience), *dhrthi* (courage), *dhi* (intelligence) etc *Tarpaka kapha - snehana* and *tarpana* qualities and nourishes the *indriyas* (sense organs).[10]
b. *Pitta dosha*	*Pakti* (digestion and metabolism), *ushma* (production of body heat), *darsanam* (visual perception), *Prabha* (lustre), *dehamardavam* (softness of tissues), maintains *medha* (intellect and memory) etc. Psychologically, it supports *sauryam* (courage) and can trigger emotions like *krodha* (anger) and *moham* (infatuation). *Sadhaka pitta* - responsible for *buddhi* (intellect), *medha* (memory and intellect), *abhimana* (self-esteem), *utsaha* (enthusiasm) etc. [11]
c. *Vata dosha*	*Vayu* is "*tantra yantra dhara*" meaning performer of all body functions.[12] Governs *gati* (movement) and *gandhana* (motor functions) within the body.[13] Regulates *indriya-vyapara* (sensory functions) [11] Ensures *avyahatagati* (unobstructed flow) in the body's channels[11] *Prana vata* - controls the *dharana* (sustaining and protection) of *buddhi* (intellect), *indriya* (sense organs), *hrdaya* (circulation) and *manas*(mind).[14] *Udana vata - controls dhi* (intellect), *dhṛtiḥ* (ability to control impulses), *smṛtiḥ* (memory), *manobodhana* (functioning of the mind).[14] *Vyana vata* are *gati*(motion), *prasarana* (extension), *akunjana* (flexion), *akshepa* (withdrawal) and *nimesha* (blinking of eyes).[14] *Vata dosha* is responsible for all the neurological and mental functions of the body.

Nidana (etiological factors) and *poorvarupa* (prodromal symptoms) of neurodegeneration

The exact causes of neurodegenerative diseases have not been fully understood. They arise for unknown reasons and progress relentlessly. Some factors like age, genetics, lower levels of Vitamin D, Hypertension, chronic stress, lack of sleep, high saturated fat diets, etc can be seen as etiological factors. It is difficult to pinpoint the exact onset of the disease, as early symptoms are subtle and easily overlooked. Symptoms develop gradually over many years

In Ayurveda *Vata prakopa* occurs in *vridhavastha* (old age)[15],*deerghakala vyadhi* (chronic illness)[16], *aniyamitha nidra* (improper sleep)[17], *seeta, ruksha ahara* (cold and dry foods)[18] and *chittavritti,soka,bhaya* (Mental strain, grief, fear)[19].

Samprapti (Pathogenesis) of neurodegenerative diseases

Neurodegenerative diseases begin with subtle cellular changes that gradually alter neuronal structure and function, eventually manifesting as symptoms like memory loss, impaired speech and reduced motor skills.

Shiras is the seat of *kapha dosha*. This indicates the predominance of *gunas* like *guru (*heavy*), manda* (slow/dull), *snigdha (*unctuous/oily*), shlakshna (*smooth*), sthira* (stable) *swabhava* in all structures in *shiras* [21]. Any changes occurring here will alter the normal *gunas* of *Kapha dosha*. thereby interrupting the normal functions of *kapha dosha* like *snehanam, Sthairyam* (firmness and stability), *ropanam* (wound-healing), *puranam* (filling of a cavity), *upacayaḥ* (anabolism), *etc* [,22,23,24] in *shiras. When* normal physiology is affected it gradually leads to *kshaya*[25]

In neurodegenerative diseases, changes specifically occur at the cellular level like protein degeneration, development of ROS etc. *Kapha kshaya lakshanas* like *sleshmashaya soonyatha* (depletion or emptiness of *kapha* sites)*, rukshata* (causing loss of moisture)*, sladha sandhi* (impaired articulation)*, dourbalya* (weakness) are seen to manifest at cellular level.

Kapha kshaya creates *dosha vaishamya*. Kapha *guna kshaya* brings about *vridhi* in normal *gunas* of *vata* like r*uksha* (dryness), *sukshma (*subtleness[26]*), etc* thus disrupting the normal functions of *vata dosha* like *vakpravrutti* (functions of speech), *indriya-vyapara(*sensory functions), *pravrithi* of *manas* (mental faculties)[27], etc. Ultimately the *Tantrayantradhara swabhava (*Maintenance of the body's structural and functional integrity) of *vata dosha* is hampered.

Considering the progress of neurodegenerative diseases, the changes at the cellular level occur in a slow pace owing to neuroplasticity[28] and redundant neural pathways[29]. Progressively, this results in neuronal loss, localized brain atrophy and culminating in deficits such as memory loss, motor incoordination, or behavioral abnormalities, depending on the affected brain regions. Ultimately, the diseases result in extensive neuronal death and loss of brain tissue leading to irreversible impairments such as severe cognitive decline, progressive motor dysfunction and loss of autonomy in daily activities.

The stage of *vata chaya* leads to *vata vridhi* which produces *samja nasa* (loss of consciousness of mind), *indriya upaghata* (loss of cognitive function), *dhainya, gatra kampa* (morbid tremor), *bala upaghata* (loss of strength), *nidra nasa* (loss of sleep), etc. Further, it leads to *Vata kopa avastha* manifesting *lakshanas* like *sarva indriyani upahanti* (loss of function of all sense organs)*, bhayah* (fear)*, sokah* (grief, sorrow or misery)[23] *anidratha* (loss of sleep)[22]*, ojo nasha* (destruction of *ojus*)*, bala varna sukha ayusah upaghata* (destroys strength, complexion and life)*, pranoparodha* (destroys life)[23] etc.

Changes occurring in neurodegeneration with respect to *Tridoshas*

Siras is *Kapha sthana*, so the normal cellular physiology that occur in Central nervous system will be in accordance with the *karmas* (functions) of *prakritha kapha (kapha dosha* in normalcy)

After understanding the normal cellular physiology in Central Nervous system*, it makes* it easier to compare between the changes occurring in neurodegeneration with respect to *tridoshas*. On exposure to the factors causing neurodegeneration, there first occurs changes at the cellular level. Considering the *tridoshas* there occurs a *guna vaishamya* in the *sthaika kapha dosha.*

Table 4: Comparison between normal cellular physiology in the Central Nervous system and functions of *Prakrita Kapha*

Normal cellular physiology in Central Nervous system	Functions of Prakrita Kapha
Stabilizing Elements: **Maintain homeostasis and balance needed for neural communication.** Ion homeostasis Blood-brain barrier Synaptic plasticity CSF dynamics	*Sandhisleshanam* *Snehanam* *Sthairyam* (firmness and stability) *Kshama* (Forbearance) *Dhi* (Intellect) *Dhriti* (Ability to control impulses) *Balam* (strength, physical endurance
Supporting Elements-provide structural and functional support to neurons Glial cells Cerebrospinal fluid, Neurovascular systems	*Ropanam* (Wound-healing) *Puranam (*Filling of cavity)
Nourishing Elements: Provide essential nutrients and energy for neuronal health and activity. Efficient delivery of nutrients (glucose, oxygen) Metabolic support from astrocytes and neurotrophic factors.	*Udakakarmana anugraham karoti* **Provides** *Dārḍhyam* (firmness*)* *Upacayaḥ (*Anabolism*)* *Utsāhaḥ (*Enthusiasm*)*

Table 5: Comparison between *Qualities of Kapha dosha and Guna vaishamya (change in the qualities) of Kapha dosha*

Qualities of ***Kapha dosha***	***Guna vaishamya* (change in the qualities) of *Kapha dosha***
Snigdhaḥ (imparting smoothness),	*Imparts dryness*
Śītaḥ (promoting coldness and stiffness)	*Causes an increase in temperature*
Guruḥ (responsible for nourishment.)	*Diminution of dhathus*
Mandaḥ (slow, mild, or low-intensity activity),	*Affects smooth conduction*
Ślakṣṇaḥ (responsible for smoothness.)	
Mrtsna (Yeilding), *Sthiraḥ* (responsible for maintaining stability and position)	*Loss of stability*

Eventually, normal functions of the *stanika dosha* (*Kapha dosha*) start disappearing at the cellular level. This can be interpreted from the cellular level changes like decreased synaptic joint integrity, damaged CNS lipids, etc. These changes can be interpreted as resulting from losing the ***snigdha*** (unctuous) and ***sthira*** (stable) *swabhavas* of *kapha dosha*. This can be understood in terms of neurodegeneration as the table below.

Table 6: Comparison between probable loss of normal functions of Kapha dosha and Changes occurring at the cellular level in neurodegeneration.

Changes occurring at the cellular level.	***Probable loss of normal functions of Kapha dosha.***
ROS (Reactive oxygen species) damages the integrity of synaptic joints	*Sandhisleshanam*
ROS (Reactive oxygen species) damages the lipids in the CNS.	*Snehanam*
Protein aggregation and ROS production disrupt the structural and functional integrity of cells	*Sthairya* (firmness and stability)
Disrupted autophagy mechanisms. Disrupted protein aggregations	*Ropana* (Wound-healing)
Inability to regenerate axonal degenerations Glial cell dysfunctions.	*Purana* (Filling of a cavity)
Impaired protein synthesis Impaired lipid metabolism. Mitochondrial dysfunction Reduced neurogenesis Deficiency of neurotrophic factors.	*Upacayaḥ* (Anabolism)
Increased cellular stress due to decreased ATP production. Reactive oxygen species lead to increased oxidative stress.	*Kshama* (Forbearance)
Impaired neuronal functions due to Oxidative stress, mitochondrial dysfunction, Protein misfolding, etc.	*Dhi* (Intellect) *Dhriti* (Ability to control impulses)
The strength of neuronal cells is lost due to mitochondrial dysfunction, oxidative stress, protein misfolding, etc.	*Bala* (strength, physical endurance)

Once the normal functions of *Kapha dosha* are disturbed here in neurodegenerative diseases, it initiates ***sthanika dosha kshaya*** (localized depletion of dosha), leading to ***Kapha kshaya*** (depletion of Kapha). The structural and functional changes observed at the cellular level in neurodegenerative diseases align closely with the characteristics of *Kapha kshaya* as described in Ayurvedic texts. These parallels can be drawn systematically, as shown in the table below, demonstrating how the cellular-level changes correspond to the clinical features of *Kapha kshaya*, highlighting an Ayurvedic perspective on the disease progression.

Table 7: Comparison between *Kapha kshaya lakshana* and Structural changes occurring at the cellular level at the initial stage of the disease.

Structural changes occurring at the cellular level at the initial stage of the disease.	***Kapha kshaya lakshana*** [32]
Loss of myelin sheath. Shortening of telomeres. DNA damage. Loss of cellular stability due to protein aggregation. Loss of extracellular matrix components. Reduced ATP formation.	*Sleshmashaya soonyatha* (depletion or emptiness of *Kapha* sites)
ROS formation leads to oxidative DNA damage, protein misfolding and aggregation.	*Rukshata* (Causing loss of moisture)
Decrease in synaptic density leading to impaired neuronal communication.	*Sladha sandhi* (impaired articulation)
Reduced ATP formation.	*Dourbalya* (weakness)

Roga (disease) is caused when there is *dosha vaishamya* (disturbance in the equilibrium of *tridoshas*).[30] *Prakrita vata* brings about normal functions of the nervous system [27].But in the pathogenesis of neurodegenerative diseases when *Kapha kshaya* (decrease in *Kapha dosha*) occurs gradually and slowly there occurs *Vata vridhi.* Here in this disease, this process takes a long time to manifest. This may be due to the *sthiratwa swabhava*(stability*)* of *kapha dosha.*

Table 8: Comparison between *vata vridhi lakshanas* and symptoms in the initial stages of development of neurodegenerative diseases.

Symptoms in the initial stages of development of neurodegenerative diseases.	***Vata vridhi lakshanas***
Memory Loss: Short-term memory loss, difficulty remembering recent events or conversations	*Samja nasa* (loss of consciousness of mind) *Indriya upaghata* (loss of cognitive function) *Dhainya*
Movement: Tremors, bradykinesia, rigidity, postural instability, muscle weakness, cramps, etc.	*Gatra kampa* (Morbid tremor) *Sphurana* *Bala upaghata* (loss of strength)
Language and speech Problems: Difficulty finding the right words and repeating oneself.	*Pralapa*
Sleep: Insomnia, REM sleep behavior disorders.	*Nidra nasa* (loss of sleep)
Bowel Habits: Constipation is common	*Mala sangam*
Different Pains: Musculoskeletal pain, dystonia pain, neuropathic pain.	*Asthi soola* *Majja sosha*

Vata vridhi leads to *vata kopa* in an accelerated pace. Here the symptoms of the disease get more evidently visible.

Table 9: Comparison between *vata kopa lakshana* and symptoms seen in the last stages of neurodegenerative diseases.

Symptoms seen in the last stages of neurodegenerative diseases.	*Vata kopa lakshana*
Severe muscle rigidity and stiffness Bradykinesia (slowness of movement) Tremors or involuntary movements (chorea, myoclonus) Loss of coordination and balance (ataxia) Complete dependence on assistance for mobility Dysphagia (difficulty swallowing) Kyphosis in Parkinson's disease. Stiffness of joints	*Sramsa* (looseness) *Vyasa* (uncontrolled movements or seizures.) *Kampa* (tremors) *Spandana (small tremors)* *Veshtana (*tightness*)* *Sthambha* (rigidity)[31] *Parvanam sankocham* (contraction of joints) *Kubjatha* (Kyphosis)[22]
Profound memory loss (short and long-term) Severe cognitive decline and confusion Inability to recognize familiar people or places Loss of planning, decision-making and difficulty with problem-solving and reasoning problems with controlling eye movements Visual and auditory hallucinations	*Mano vyaharsham* (Instability in mental functions) [23] *Sarva indriyani upahanti* (loss of function of all sense organs) [23] *Bhayah* (fear)[23] *Sokah* (Grief, sorrow or misery) [23] *Dhainya*
Severe speech difficulties (dysarthria) Aphasia and Complete loss of verbal communication. Inability to find words or form coherent sentences.	*Pralapa*(delirium)
Electric shock or a pins-and-needles sensation pains due to nerve dysfunction Aching, throbbing, or cramping musculoskeletal pains and Muscle cramps Abnormal temperature	*Vyadha (*hitting pain) *Ruk* (constant pain) *Toda* (pricking pain) *Bheda* (splitting pain) *Angabhanga[21]*
Numbness or a reduced ability to feel pain and temperature changes.	*Swapa* (sensory loss) [21]
Contractures cause permanent joint stiffness and deformity Severe constipation or Bowel incontinence Alternating patterns of constipation and diarrhea and Impaired Bowel Peristalsis	*Sada* (inability to perform normal functions) [21] *Vartana* (round masses) [21] *Tarshana* (pipasa) [21] *Sangam* (obstruction) [21]
Changes in taste perception	*Kashaya rasatha* (likeness for *Kashaya rasa)[21]*
Increased susceptibility to infections Xerosis (dry skin), Pruritus (itching) Skin thinning and fragility Ecchymosis (bruising), Poor wound healing Changes in skin color (pallor or mottling)	*Shyavaaruna varna* (reddish black discoloration) [21] *Parushya* (roughness)[21]
Severe sleep disturbances (insomnia)	*Anidratha* (loss of sleep) [22]
Significant weight loss and malnutrition due to difficulty eating Increased susceptibility to infections due to immunosuppression. Breathlessness, severe fatigue and eventual failure of essential bodily functions.	*Ojo nasha* (destruction of *ojus*) [31] *Bala varna sukha ayusah upaghata* (destroys strength, complexion and life) [31] *Pranoparodha* (destroys life) [23]

Probable mode of action of neuroprotective drugs

Neurodegenerative diseases primarily affect the central nervous system (CNS)**,** which includes the brain and spinal cord. *Masthishka* (brain) and *Indriyas* (sense organs) are located in the *shiras* (head). *Shiras* is the seat of *kapha dosha* and *prana* (vitality). *Kapha dosha* in normalcy helps maintain the structure of *masthishka* (brain) which is described to be like solidified ghee. The *snigdha* (unctous), *seeta* (cold), *guru* (heavy), *sthirah* (stability) *gunas* of *kapha* helps in maintaining the normal structure and function of the *masthishka*. Though the pathology involved in these diseases remain unclear some common etiological factors are seen to trigger the progress of neurodegenerative diseases. For example, old age, sleep dysfunctions, a western diet like high salt content sauces, packeted foods, fried foods, stress, excessive exercise, etc. These factors reduce the *snigdhadhi gunas* of *kapha* gradually leading to *kapha kshaya* for several years. Over time decrease in *snigdhadi gunas* leads to the *vridhi* (increase) of *ruksha* (dryness), *laghu* (lightness), *khara* (roughness) *gunas* leading to *vata vridhi* which ultimately lead to *vata kopa*. Drugs which possess *Madhura rasa* as *madhura rasa* is *hladana* and *akshaprasadana, Snigdha* and *guru guna* as both *gunas* are *vatahara* and *sleshma vardhaka, Seeta veerya* and *Madhura vipaka and also possess qualities like Balya, Brimhana and has action on the nervous system like Bala (Sida cordifolia.L) can be used*. Thus, the drug of choice for these diseases should possess *gunas* (qualities) that pacify *vata kopa* and at the same time help in maintaining the *gunas* of *kapha dosha.*

Conclusion

Neurodegenerative diseases present complex challenges due to their progressive and multifactorial nature, affecting both neuronal structure and function over time. While conventional medicine has illuminated specific pathological mechanisms, such as oxidative stress, protein aggregation and mitochondrial dysfunction, the treatments primarily address symptoms rather than root causes. Ayurveda offers complementary strategies that align with these molecular insights. By analyzing the disease from the point of the *gunas* (qualities) of doshas involved in the disease manifestation beginning from the subtle stage and the use of neuroprotective herbs, diet and rejuvenating therapies, Ayurveda provides a framework that could potentially mitigate disease progression at an early stage, address systemic imbalances and enhance resilience. This integrative model may serve as a valuable addition to modern therapeutic approaches, aiming not only for symptom management but for promoting long-term neuronal health and quality of life. Further research on the Ayurvedic principles of neurodegeneration is the need of the hour to deepen our understanding and expand effective treatment avenues given the global burden of neurodegenerative diseases.

References

1. Article Gagandeep Singh, Meenakshi Sharma et.al. The burden of neurological disorders across the states of India: the Global Burden of Disease Study 1990–2019,The Lancet Global Health, volume 9, issue 8, e1129-e1144, august 01, 2021.pg 1.
2. Jellinger KA. Basic mechanisms of neurodegeneration: a critical update. J Cell Mol Med. 2010 Jan;14(3):478-500.
3. Wang Y, Kuca K, You L, Nepovimova E, Heger Z, Valko M, Adam V, Wu Q, Jomova K. The role of cellular senescence in neurodegenerative diseases. Arch Toxicol. 2024 Aug;98(8):2393-2408. doi: 10.1007/s00204-024-03768-5. Epub 2024 May 15. PMID: 38744709; PMCID: PMC11272704.
4. Sharma RK, Bhagavan Dash. Charaka Samhita. Vol. II. Sareerasthana, Chapter 17. Reprint ed. Varanasi: Chaukambha Sanskrit Series Office; 2015. Sloka 12.
5. Srikantha Murthy KR. Ashtanga Samgraha Sutrasthana. Chapter 20. Reprint. Varanasi: Choukhambha Orientalia; 2005. sloka 3.
6. Sharma RK, Dash B. Charaka Samhitha. Vol II. Sareerasthana Chapter 7. Reprint ed. Varanasi: Chaukambha Sanskrit Series Office; 2015. sloka 14.
7. Jadvaji Trikamji Acharya. Susruta Samhita of Susruta with Nibandha Sangraha. Sareerasthana Chapter 10. Reprint ed. Varanasi: Chaukhamba Sanskrit Sansthan; 2013. sloka 42
8. Sharma RK, Bhagavan Dash. Charaka samhitha Vol II, Sareerasthana, chapter 1. Reprint ed. Varanasi: Chaukambha Sanskrit series office; 2015. sloka 18.
9. Sharma RK, Bhagavan Dash. Charaka Samhitha Vol I Sutrasthana Chapter 8. Reprint ed. Varanasi: Chaukambha Sanskrit Series Office; 2015. pg 173, sloka 14.
10. Srikantha Murthy.K.R.Ashtanga Samgraha Sutrasthana Chapter 20 .Reprint Varanasi: Choukhambha Orientalia;2005. sloka 8
11. Srikantha Murthy K.R. Ashtanga Hridayam Vol I Sutrasthana Chapter 12. Reprint. Varanasi: Chowkhambha Krishnadas Academy;2023. sloka 13
12. Sharma RK and Bhagavan Dash. Charaka Samhitha Vol I Sutrasthana Chapter 12 Reprint ed. Varanasi: Chaukambha sanskrit series office; 2015. sloka 3
13. Jadvaji Trikamji Acharya. Susruta Samhita of Susruta with Nibandha Sangraha Sutrasthana Chapter 21. Reprint ed Varanasi: Chaukhamba Sanskrit Sansthan; 2013. sloka 5
14. Srikantha Murthy K.R. Ashtanga Hridayam Vol I Sutrasthana Chapter 20. Reprint. Varanasi: Chowkhambha Krishnadas Academy;2023. sloka 6
15. Jadvaji Trikamji Acharya. Sushruta samhita. Sutrasthana, Chapter 7. Reprint ed. Varanasi: Chaukhamba Sanskrit Sansthan; 2013.pg 85, sloka 32
16. Srikantha Murthy K.R. Ashtanga hridaya. Sutrasthana, Chapter 11. Reprint. Varanasi: Chowkhambha Krishnadas Academy; 2023.pg 118, sloka 4
17. Jadvaji Trikamji Acharya. Sushruta samhita. Sutrasthana, Chapter 9. Reprint ed. Varanasi: Chaukhamba Sanskrit Sansthan; 2013.pg 110, sloka 12
18. Sharma RK, Bhagavan Dash. Charaka samhita. Sutrasthana, Chapter 21. Reprint ed. Varanasi: Chaukambha Sanskrit Series Office; 2015.pg326, sloka 12.
19. Srikantha Murthy K.R. Ashtanga hridaya. Sutrasthana, Chapter 4. Reprint. Varanasi: Chowkhambha Krishnadas Academy; 2023.pg 56, sloka 43
20. Sharma RK, Bhagavan Dash. Charaka samhita. Sutrasthana, Chapter 28. Reprint ed. Varanasi: Chaukambha Sanskrit Series Office; 2015. pg.230
21. Vagbhata. Ashtanga Hridaya Vol II. Trans Prof. K R Srikantha Murthy. 9th ed. Varanasi: Chaukhambha Krishnadas Academy; 2013. Sutra sthana, Chapter 1. sloka 12
22. Susrutha. Illustrated Susrutha Samhitha vol1.Trans Prof. K. R. Srikantamurthy Third ed. Varanasi: Choukambha Orientalia 2007 Sutrastana chapter15 sloka 4
23. Vagbhata. Ashtanga Samgraha of Vagbhata Vol.1. Professor Srikantha Murthy. Choukhambha Orientalia;2005Sutrasthana19 sloka 2
24. Vagbhata. Ashtanga Hridaya Vol II. Trans Prof. K R Srikantha Murthy. 9th ed. Varanasi: Chaukhambha Krishnadas Academy; 2013. Sutra sthana, Chapter11. sloka 3
25. Sharma RK, Bhagavan Dash. Charaka samhita. Sutrasthana, Chapter 17. Reprint ed. Varanasi: Chaukambha Sanskrit series office; 2015. sloka 117.
26. Sharma RK, Bhagavan Dash. Charaka samhita. Sutrasthana, Chapter 12. Reprint ed. Varanasi: Chaukambha Sanskrit series office; 2015. sloka 8.
27. Agnivesa. Charaka Samhita Vol V. Trans R K Sharma, Bhagwan Dash.Reprint ed. Varanasi: Chaukambha Sanskrit series office; 2013.Sutra sthana, Chapter 12. sloka 8
28. Kleim JA, Jones TA. Principles of experience-dependent neural plasticity: implications for rehabilitation after brain damage. J

Speech Lang Hear Res. 2008 Feb;51(1): S225-39. doi: 10.1044/1092-4388(2008/018). PMID: 18230848.

29. Mizusaki BEP, O'Donnell C. Neural circuit function redundancy in brain disorders. Curr Opin Neurobiol. 2021 Oct; 70:74-80. doi: 10.1016/j.conb.2021.07.008. Epub 2021 Aug 17. PMID: 34416675; PMCID: PMC8694099.
30. Vagbhata. Ashtanga Hridaya Vol II. Trans Prof. K R Srikantha Murthy. 9th ed. Varanasi: Chaukhambha Krishnadas Academy; 2013. Sutra sthana, Chapter 1. sloka 20
31. Vagbhata. Ashtanga Hridaya Vol II. Trans Prof. K R Srikantha Murthy. 9th ed. Varanasi: Chaukhambha Krishnadas Academy; 2013. Sutra sthana, Chapter 12. sloka 49.
32. Susrutha. Illustrated Susrutha Samhitha vol1.Trans Prof. K. R. Srikantamurthy Third ed. Varanasi: Choukambha Orientalia 2007 Sutrastana chapter15 sloka 4.

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