

Review Article

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**A CRITICAL STUDY OF ANATOMICAL CHANGES OF AGING AND EFFECT OF
ASHWAGANDHA AS RASAYANA IN LONGEVITY – AN AYURVEDIC REVIEW**

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ABSTRACT

Background: Aging is a natural and progressive biological process characterized by structural and functional decline in various tissues and organ systems. In modern science, it is associated with cellular senescence, oxidative stress, reduced regenerative capacity, and degenerative anatomical alterations. In *Ayurveda*, aging is described as *Jara*, a *Swabhavika Vyadhi*, primarily influenced by *Vata Dosha* predominance and gradual depletion of *Dhatu*. Classical texts emphasize preservation of tissue integrity and vitality through *Rasayana* therapy. **Aim:** To critically analyze anatomical changes occurring during aging from both modern and *Ayurvedic* perspectives and to evaluate the role of *Ashwagandha* as a *Rasayana* in promoting longevity. **Objectives:** To review anatomical and structural changes associated with aging. To analyze the concept of *Jara* and *Dhatu Kshaya* in *Ayurveda*. To evaluate the *Rasayana* properties of *Ashwagandha*. To correlate classical descriptions with modern scientific findings on anti-aging effects. **Materials and Methods:** This is a narrative review based on classical *Ayurvedic* texts including *Charaka Samhita*, *Sushruta Samhita*, and

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Ashtanga Hridaya, along with modern anatomical, physiological, and pharmacological literature. Relevant research articles on the anti-aging and adaptogenic effects of *Ashwagandha* were analyzed and interpreted. **Results:** Aging leads to progressive reduction in tissue elasticity, bone density, muscle mass, neuronal integrity, and immune responsiveness. In *Ayurveda*, these changes correspond to *Vata Vriddhi* and *Dhatu Kshaya*, particularly of *Rasa*, *Mamsa*, *Asthi*, and *Majja Dhatu*. *Ashwagandha*, described as *Balya*, *Rasayana*, and *Vatahara*, supports tissue nourishment, enhances strength, improves neuroendocrine balance, and exhibits antioxidant and immunomodulatory properties. Contemporary studies demonstrate its role in reducing oxidative stress, improving muscle mass, supporting bone health, and enhancing cognitive function. **Conclusion:** Aging reflects both anatomical degeneration and functional decline, which aligns with the concept of *Jara* in *Ayurveda*. *Ashwagandha*, as a potent *Rasayana*, offers a holistic approach to slow degenerative changes, maintain structural integrity, and promote healthy longevity. Integrating classical wisdom with modern evidence supports its potential role in age-related anatomical preservation.

Keywords: *Jara*, *Dhatu Kshaya*, *Ashwagandha*, *Rasayana*, Aging, Longevity

INTRODUCTION

Aging is a universal and inevitable biological phenomenon marked by gradual structural and functional decline of the body. With advancing age, there is progressive reduction in cellular regeneration, tissue elasticity, muscle bulk, bone density, and organ efficiency. These anatomical alterations are not sudden events but slow cumulative processes influenced by genetics, metabolism, environmental exposure, and lifestyle. Modern science explains aging through mechanisms such as oxidative stress, telomere shortening, mitochondrial dysfunction, and cellular senescence. As life expectancy increases worldwide, maintaining quality of life during aging has become an important medical and social concern.¹

In *Ayurveda*, aging is described as *Jara*, a natural stage of life and one among the *Swabhavika Vyadhi*.² It is characterized by progressive dominance of *Vata Dosha*, leading to degeneration, dryness, reduced strength, and tissue depletion. Classical texts clearly mention that with advancing age there is gradual *Dhatu Kshaya*,³ resulting in reduced vitality, impaired

immunity, decreased sensory perception, and diminished physical endurance. The structural changes observed in bones, muscles, skin, and nervous system can be correlated with depletion of *Asthi*, *Mamsa*, *Rasa*, and *Majja Dhatu*. Thus, the Ayurvedic concept of aging is deeply anatomical as well as functional.

The preservation of anatomical integrity and vitality is strongly emphasized in *Ayurveda* through the concept of *Rasayana*. *Rasayana Chikitsa*⁴ aims not merely at disease management but at improving tissue nutrition, enhancing immunity, promoting longevity, and maintaining youthfulness. It works at the level of *Agni*, *Srotas*, and *Dhatu Poshana*, ensuring proper nourishment of successive tissues. By maintaining equilibrium of *Dosha* and preventing premature degeneration, *Rasayana*⁵ therapy supports graceful aging rather than pathological aging.

Among various *Rasayana Dravya*, *Ashwagandha* holds a significant position. It is described as *Balya*, *Brihmana*, *Vatahara*, and *Rasayana*, making it particularly suitable in age-related degeneration dominated by *Vata*.⁶ Classical references highlight its role in improving strength, promoting tissue nourishment, and enhancing longevity. Modern research also supports its adaptogenic, antioxidant, neuroprotective, and anabolic properties. Therefore, studying anatomical changes of aging along with the role of *Ashwagandha* as a *Rasayana* becomes highly relevant for understanding healthy longevity from an integrative perspective.

AIM AND OBJECTIVES

Aim:

To critically analyze anatomical changes occurring during aging from both modern and *Ayurvedic* perspectives and to evaluate the role of *Ashwagandha* as a *Rasayana* in promoting longevity.

Objectives:

- To review anatomical and structural changes associated with aging.
- To analyze the concept of *Jara* and *Dhatu Kshaya* in *Ayurveda*.
- To evaluate the *Rasayana* properties of *Ashwagandha*.
- To correlate classical descriptions with modern scientific findings on anti-aging effects.

CONCEPTUAL STUDY

RASAYANA

The term *Rasayana* is derived from two words, *Rasa* and *Ayana*. *Rasa* refers to the primary nourishing fluid as well as the essence responsible for sustaining life, while *Ayana* means path or movement. Thus, *Rasayana*⁷ literally means the pathway that promotes proper circulation and nourishment of *Rasa Dhatu* throughout the body. Conceptually, it indicates a therapeutic approach that enhances tissue nutrition, improves vitality, and sustains longevity by ensuring optimal metabolic transformation and tissue replenishment.

In classical *Ayurveda*, *Rasayana* is described as a specialized therapy aimed at promoting *Ayushya*⁸ (long life), *Smriti* (memory), *Medha*⁹ (intellect), *Bala*¹⁰ (strength), and resistance against disease. It is not limited to anti-aging alone but represents a comprehensive rejuvenation strategy. By enhancing the quality of *Rasa Dhatu*,¹¹ it indirectly nourishes subsequent *Dhatu* through proper *Dhatu Poshana Nyaya*. Therefore, *Rasayana* works at a fundamental physiological level rather than merely correcting symptoms.

Mechanism of Action of Rasayana

The action of *Rasayana* can be understood through three primary mechanisms.

- It improves *Agni*, ensuring proper digestion and metabolism.
- It maintains patency of *Srotas*, facilitating efficient nutrient transport.
- It enhances qualitative and quantitative integrity of *Dhatu*.

By acting at these three levels, *Rasayana* prevents premature *Dhatu Kshaya* and supports structural stability. In the context of aging, this helps counteract degeneration associated with *Vata Vriddhi*.

Classification of Rasayana

Classical texts categorize *Rasayana* into different types based on administration and purpose.

- *Kutipravesika Rasayana* involves intensive rejuvenation in a controlled environment.
- *Vatatapika Rasayana* is administered without strict isolation and is more practical.
- *Kamyā Rasayana* aims at specific benefits like intellect or complexion enhancement.

- *Naimittika Rasayana* is disease-specific and supports management of particular conditions.
- Each type addresses rejuvenation at different levels, ranging from preventive to therapeutic application.

Rasayana and Aging (Jara)

Aging is characterized by dominance of *Vata Dosha* and progressive *Dhatu Kshaya*¹². This leads to dryness of skin, loss of muscle tone, bone fragility, reduced cognitive function, and weakened immunity. *Rasayana* therapy directly counters these processes by promoting nourishment, stability, and strength. It supports regeneration and preserves anatomical integrity, thereby slowing the degenerative cascade associated with *Jara*.

Longevity in *Ayurveda* is not merely survival but living with preserved physical strength, mental clarity, and social productivity. *Rasayana* contributes to this by enhancing tissue resilience, improving adaptability to stress, and maintaining systemic balance. In modern understanding, this correlates with improved immune modulation, antioxidant defense, endocrine regulation, and neuroprotection. Thus, *Rasayana* represents a holistic anti-aging strategy that integrates structural preservation with functional optimization.

DRUG REVIEW (ASHWAGANDHA)

*Ashwagandha*¹³ (*Withania somnifera*) is one of the most important *Rasayana Dravya* described in *Ayurveda*. It is widely used for promoting strength, vitality, tissue nourishment, and longevity. The name *Ashwagandha* indicates that the drug imparts strength like a horse and possesses a characteristic odor resembling that of a horse. It is especially indicated in conditions of debility, aging, neuromuscular weakness, stress disorders, and degenerative diseases. Because aging is predominantly associated with *Vata Vriddhi* and *Dhatu Kshaya*, *Ashwagandha* becomes highly relevant in preserving anatomical and functional integrity.

Synonyms (Classical Names)

- *Ashwagandha*
- *Vajigandha*¹⁴
- *Balada*¹⁵
- *Varahakarni*¹⁶

- *Hayapriya*¹⁷

Botanical Profile

- Botanical Name: *Withania somnifera*
- Family: Solanaceae
- Part Used: Mainly root, sometimes leaves and seeds
- Distribution: Cultivated widely in India, especially in dry regions
- It is a small shrub with dull green leaves, small greenish-yellow flowers, and red berries enclosed in a papery calyx.

Pharmacodynamic Properties (*Rasapanchaka*)¹⁸

- *Rasa* – Tikta, Kashaya
- *Guna* – Laghu, Snigdha
- *Virya* – Ushna
- *Vipaka* – Madhura
- *Prabhava* – *Balya* and *Rasayana* effect

Action on *Dosha, Dhatu, and Srotas*¹⁹

- Pacifies aggravated *Vata*
- Supports nourishment of *Rasa, Mamsa, Asthi, and Majja Dhatu*
- Strengthens *Shukra Dhatu*
- Improves patency of *Srotas*
- During aging, dryness, tissue depletion, and weakness are common. *Ashwagandha* acts by promoting tissue replenishment and restoring strength.

Classical Indications

- *Kshaya*²⁰ (tissue depletion)
- *Balakshaya*²¹ (loss of strength)
- *Mamsa Kshaya*²²

- *Shukra Kshaya*²³
- Neurological weakness
- Stress-related disorders
- Its mention under *Rasayana Varga* confirms its rejuvenative potential.

Mechanism of Action in Aging

Aging involves progressive *Dhatu Kshaya* and dominance of *Vata Dosha*. This leads to muscle wasting, osteoporosis, memory decline, joint degeneration, and reduced immunity.

Ashwagandha works at multiple levels:

- Enhances *Agni*, ensuring better nutrient assimilation
- Promotes proper *Dhatu Poshana*
- Provides *Brihmana* effect, increasing body mass and strength
- Maintains neuroendocrine balance
- Thus, it helps slow anatomical deterioration.

Modern Pharmacological Actions

Scientific research supports multiple therapeutic effects:

- Adaptogenic activity
- Anti-oxidant action reducing oxidative stress
- Anti-inflammatory effect
- Neuroprotective property
- Immunomodulatory action
- Muscle strengthening effect
- Bone-protective role

Role in Longevity

Longevity in *Ayurveda* depends on maintenance of structural stability and functional capacity.

Ashwagandha supports:

- Preservation of muscle bulk
- Improvement in bone mineral density
- Enhancement of cognitive clarity
- Better stress adaptation
- Improved sleep quality

Dosage and Formulations

Common forms include:

- *Ashwagandha Churna*
- *Ashwagandha Ghrita*
- *Ashwagandha Avaleha*
- Capsules or standardized extracts

Safety and Precautions

Ashwagandha is generally safe when used in recommended dosage. However:

- Use cautiously in hyperthyroidism
- Avoid excessive dose in high *Pitta Prakriti* individuals
- Monitor in pregnancy
- Proper physician supervision is always advised.

Anatomical Changes of Aging and Effect of *Ashwagandha* as *Rasayana* in Longevity (In Short)

Anatomical Changes of Aging

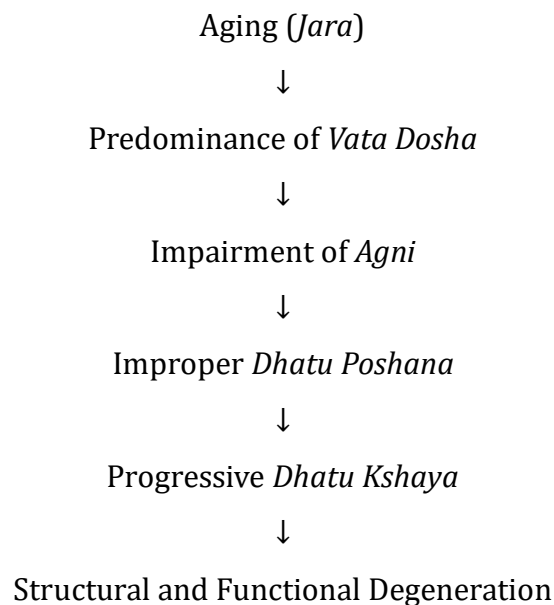
- Thinning and dryness of skin due to reduced collagen (*Rasa Dhatu Kshaya, Vata Vriddhi*)
- Loss of muscle mass and strength (*Mamsa Dhatu Kshaya*)
- Decreased bone density and joint degeneration (*Asthi Dhatu Kshaya*)
- Memory decline and neuronal loss (*Majja Dhatu Kshaya*)

- Reduced cardiac efficiency and vascular elasticity
- Hormonal decline and slower metabolism
- Weak immunity due to reduction of *Ojas*
- Decreased reproductive vitality (*Shukra Dhatu Kshaya*)

Effect of *Ashwagandha* as *Rasayana*

- Nourishes *Rasa* and prevents dryness
- Improves muscle strength through *Brihmana* action
- Supports bone strength and stability
- Enhances memory and neuroprotection
- Acts as adaptogen and balances hormones
- Improves immunity and promotes *Ojas*
- Counters *Vata Vriddhi*
- Delays *Dhatu Kshaya* and supports healthy longevity

Aging Process (Pathogenesis View)



Anatomical Changes During Aging

Vata Vriddhi

↓

- Skin thinning, dryness → (*Rasa Dhatu Kshaya*)
 - Muscle wasting → (*Mamsa Dhatu Kshaya*)
 - Bone fragility → (*Asthi Dhatu Kshaya*)
 - Neuronal decline → (*Majja Dhatu Kshaya*)
 - Reduced immunity → Decreased *Ojas*
 - Hormonal decline → Reduced vitality

↓

Reduced Strength, Memory, and Longevity

Intervention with *Ashwagandha* as *Rasayana*

Administration of *Ashwagandha*

↓

Enhancement of *Agni*

↓

Improved *Srotas* Patency

↓

Proper *Dhatu Poshana*

↓

- Nourishment of *Rasa*
- Strengthening of *Mamsa*
 - Support to *Asthi*
- Rejuvenation of *Majja*
- Promotion of *Ojas*

↓

Improved Strength (*Bala*) + Stability + Immunity

↓

Delay in Degeneration

↓

Healthy and Active Longevity

Overall Concept

Aging (Jara)

→ *Vata* Dominance

→ *Dhatu Kshaya*

→ Anatomical Decline

Ashwagandha (Rasayana)

→ *Vata Shamana*

→ *Dhatu Pushti*

→ Structural Preservation

→ Promotion of Longevity

RESULTS AND FINDINGS

- Aging is associated with progressive *Vata Vriddhi* and decline in tissue nourishment.
- Evident *Rasa Dhatu Kshaya* presents as dryness, thinning of skin, and reduced elasticity.
- *Mamsa Dhatu Kshaya* leads to sarcopenia and decreased muscle strength.
- *Asthi Dhatu Kshaya* correlates with reduced bone mineral density and osteoporosis.
- *Majja Dhatu Kshaya* is reflected in cognitive decline and neuronal degeneration.
- Reduced *Ojas* results in compromised immunity and delayed healing.
- Hormonal decline contributes to reduced vitality and metabolic slowdown.
- Overall structural degeneration leads to decreased functional capacity and quality of life.
- Demonstrates significant *Vata Shamana* action, addressing root cause of degenerative aging.
- Enhances *Agni* and supports efficient *Dhatu Poshana*.
- Improves muscle mass and strength, indicating reversal of *Mamsa Dhatu Kshaya*.
- Supports bone health and density, strengthening *Asthi Dhatu*.
- Exhibits neuroprotective effects and cognitive enhancement, nourishing *Majja Dhatu*.
- Shows antioxidant and anti-inflammatory activity, reducing oxidative damage.

- Enhances immune modulation and promotes *Ojas Vriddhi*.
- Improves stress tolerance through adaptogenic properties.
- Contributes to overall vitality, stamina, and improved quality of life.
- Anatomical degeneration in aging aligns with classical concept of *Jara* and *Dhatu Kshaya*.
- *Ashwagandha*, as a potent *Rasayana*, supports structural preservation and functional stability.
- The combined classical and modern evidence suggests its beneficial role in promoting healthy longevity.

DISCUSSION

Aging is described in *Ayurveda* as *Jara*, a natural yet progressive condition marked by dominance of *Vata Dosha* and gradual *Dhatu Kshaya*. The anatomical changes observed in modern science such as muscle wasting, osteoporosis, neuronal decline, skin thinning, and reduced immunity closely correlate with depletion of *Mamsa*, *Asthi*, *Majja*, and *Rasa Dhatu*. This shows that classical concepts were not abstract ideas but practical observations of structural degeneration. The dryness, instability, and loss of strength seen in elderly individuals clearly reflect increased *Vata* and reduced tissue nourishment.²⁴

The concept of *Rasayana* becomes highly relevant in this context because it directly addresses the root mechanisms of degeneration. Rather than targeting isolated symptoms, *Rasayana* improves *Agni*, ensures proper *Srotas* patency, and enhances qualitative *Dhatu Poshana*. This multidimensional action supports both anatomical preservation and functional efficiency. When tissue metabolism remains efficient, the cascade of degeneration slows down. Therefore, *Rasayana Chikitsa* can be understood as a preventive and promotive strategy aimed at maintaining structural integrity during aging.²⁵

Ashwagandha, being a classical *Rasayana Dravya*, plays a central role in healthy longevity. Its *Vatahara*, *Balya*, and *Brihmana* properties counteract tissue depletion and weakness. Modern research further supports its antioxidant, neuroprotective, immunomodulatory, and anabolic effects, which align well with classical descriptions. By nourishing depleted tissues, improving stress adaptation, and supporting endocrine balance, *Ashwagandha* bridges

traditional wisdom and contemporary evidence. Thus, it offers a holistic approach for promoting active, stable, and healthy aging rather than merely prolonging lifespan.²⁶

CONCLUSION

Aging, described as *Jara* in *Ayurveda*, is characterized by progressive *Vata Vriddhi* and *Dhatu Kshaya*, leading to structural and functional decline across multiple body systems. The anatomical changes observed in skin, muscles, bones, nervous tissue, and immunity clearly correlate with classical concepts of tissue depletion and reduced *Ojas*. The concept of *Rasayana* offers a preventive and promotive approach by enhancing *Agni*, improving *Dhatu Poshana*, and maintaining systemic balance. Among various rejuvenative drugs, *Ashwagandha* stands out as a potent *Rasayana Dravya* due to its *Balya*, *Brihmana*, and *Vatahara* properties, supported by modern evidence of antioxidant, neuroprotective, and adaptogenic effects. Therefore, *Ashwagandha* plays a significant role in preserving anatomical integrity, enhancing vitality, and promoting healthy longevity from an integrative perspective.

CONFLICT OF INTEREST -NIL

SOURCE OF SUPPORT -NONE

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