

## **Effect of Rasayana on Organelle Ageing: A Comprehensive Study**

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### **Abstract**

In Ayurveda, ageing is viewed as a Swabhavik Vyadhi (Natural disease) intrinsic to living beings, encompassing physical, psychological, and social changes. Jara Chikitsa (Geriatrics) in Ayurveda addresses ageing issues, primarily employing Rasayanas (Rejuvenation therapy). Rasayanas, promote health, strength, and longevity, and enhance fundamental tissues like Dhātu, Agni, and Strotas, preventing ageing, bolstering bodily and mental faculties, and fortifying against diseases. Suited for middle-aged patients, timely Rasayana use not only mitigates ageing but nourishes and rejuvenates the body overall.

Human organs age disparately. This paper explores Organelle ageing, its early onset contributors, and the correlation between Rasayanas and organ-specific rejuvenation, examining their impact on ageing delay. The discussion, aligning with Rasayana Chikitsa, elucidates prevention, treatment, and management, fostering graceful and healthy ageing.

**Keywords:** *Rasayana*, Anti-Ageing Therapy, Organelle Ageing, *Jara-Chikitsa*

### **Introduction**

#### **Definition of Ageing**

Ageing is a ubiquitous characteristic observed throughout the evolutionary spectrum. From a public health standpoint, ageing stands out as a crucial risk factor for various human pathologies, notably neurodegenerative diseases. Although challenging to articulate precisely, ageing is generally described as a 'process of unfavourable progressive change,' typically associated with the passage of time. It becomes evident after maturity and inevitably leads to the individual's death. Another widely embraced definition characterizes ageing as 'the processes during life culminating in changes diminishing an individual's ability to cope with biological changes.'

While ageing encompasses both positive developmental aspects and negative declines,

senescence specifically denotes degenerative processes that ultimately render continued life impossible. Not all age-related changes, including those occurring in late life, are detrimental (e.g., grey hair, baldness), and some may even be desirable (e.g., increased wisdom and experience).

Normal ageing encompasses the common array of diseases and impairments prevalent in the elderly. In contrast, Successful (Healthy) ageing signifies a process wherein deleterious effects are minimized, preserving function until senescence inevitably precludes sustained life.

### **Review of Ageing**

Age can be conceptualized in three distinct dimensions [2]:

1. Calendar Age
2. Biological Age
3. Psychological Age

While the progression of time, represented by the Calendar Age, is continuous and irreversible, the principles of Ayurveda, particularly Rasayana, offer the potential for stabilization or regeneration in the realms of Biological and Psychological Age.

Of the three age categories—Calendar Age, Biological Age, and Psychological Age—the first remains immutable. However, the latter two can be effectively prevented and delayed through the practice of Rasayana Chikitsa in Ayurveda, along with the adoption of Swasthavritta and SadaVritta principles.

### **Causes of Ageing**

#### **Measuring Ageing Effects [6]**

Ageing changes often correlate with an elevated likelihood of mortality, but this isn't universally applicable. For instance, greying of hair is an ageing symptom that doesn't necessarily increase the probability of mortality. Changes associated with ageing, not linked to a particular disease but indicating a generalized rise in mortality, could potentially serve as biomarkers of ageing. These biomarkers would discern biological age from chronological age, offering more accurate predictions of increased mortality likelihood, irrespective of specific diseases. While cross-linking of collagen, insulin resistance, and lung expiration

capacity have been proposed as potential candidates, there are currently no universally validated biomarkers of ageing.

### **Rasayana in Ayurveda**

Rasayana is a compound of two terms, "Rasa" and "Ayana." Here, "Rasa" pertains to Dhatu, signifying tissues, while "Ayana" refers to Marga, representing movement. Consequently, Rasayana primarily nourishes the Rasadi Dhatus, specifically plasma. In Ayurveda, Rasayana, or Rejuvenation therapy, holds a distinct status as one of the most specialized methods. It serves as a therapeutic process aiming to enhance immunity, elevate anti-degenerative agents, rejuvenate overall health, and prevent ageing symptoms. Thus, Rasayana possesses the capacity to enhance the quality of life for both healthy individuals and those grappling with health issues.

In Ayurveda, the term "Jara," denoting ageing, is termed "Vardhakya." While mature ageing, known as Kalajajara, is not considered curable, Rasayana can contribute to maintaining vitality in cellular homeostasis, facilitating graceful ageing. The practices related to Akalajajara, or premature ageing, are manageable and controllable with the assistance of Rasayana, as advocated by the Acharyas (Sages) in Ayurveda.

### **Mode of Action of *Rasayana Dravyas***

Rasayana substances are employed for maintaining optimal health. According to Acharya Sushruta, a healthy individual is characterized by a balance of Doshas, proper functioning of Agni, normalcy in the seven dhatus, and a state of happiness and cheerfulness in the soul, sense organs, and mind. Rasayana emerges as a solution to attain not only a prolonged healthful life but also mental development and resilience against diverse diseases.

### **Classification of *Rasayana***

#### **1) According to the Mode of Administration of Rasayana:**

- a) Kutipravesika Rasayana : Involves the individual residing in a specially designed chamber for a specific period while receiving Rasayana preparations.
- b) Vatatapika: Allows the person to continue regular activities while undergoing Rasayana administration.
- c) DroniPravesika: Requires the person to lie in a particular type of wooden casket for six

months (unconscious) after consuming specific herbs, though this is not commonly practised in recent times [7].

## **2) According to the Purpose of Administration:**

- a) Kamyā Rasayana: Enhances normal health by boosting energy levels, immunity, and overall well-being.
  - \*Pranakamyā:\* Promotes vitality and longevity.
  - \*Medhakamyā:\* Enhances intelligence.
  - \*Srikamyā:\* Improves complexion.
- b) Nimitta: Involves short and specific periods of administration, primarily used for treating diseases.
- c) Ajasrika Rasayana: Involves the regular consumption of food substances for body nourishment.

## **3) According to the Mode of Action:**

- a) Sanshodhan Rasayana
- b) Sanshaman Rasayana

## **4) Aachara Rasayana:**

Refers to how a person should behave while living in society.

## **Modern Interpretation**

The potential mechanisms through which the action of Rasayana can be interpreted align with modern aspects:

### **1. Antioxidant Action:**

Antioxidants, present in serum, inhibit the oxidation of targets, offering protection against damage caused by oxygen free radicals.

### **2. Immunomodulatory Action:**

Immunomodulators alter the immune response by enhancing or reducing the immune system's ability to produce antibodies or sensitized cells reacting to the initiating antigen [8].

### **3. Adaptogenic Action:**

Adaptogens, like Ashwagandha, Tulsi, Haridra, Pippali, Amalaki, Guduchi, and Shatavari,

function as metabolic regulators, enhancing the organism's ability to adapt to physiological or psychological environmental factors, such as injury, ageing, or anxiety.

#### **4. Nootropic Effects:**

Nootropics, promoting intelligence and brain functions, fall under the category of Medhya Rasayana drugs. Key examples include Mandookparni, Guduchi, Yashtimadhu, and Shankhpushpi [9].

#### **5. Anabolic Effects:**

Early investigations on Rasayana drugs aimed to understand their role in metabolism and tissue building. Dravyas like Aamalaki, Gambhari, Pippali, Shatavari, Guduchi, and Shilajatu showed positive indications. Regular administration improved nitrogen balance, promoting tissue building.

**Administration of Rasayana Drugs:** Following Samshodhana and Samsarjana Karma, suitable Rasayana Dravya is administered to individuals, considering factors like age, Prakriti, Koshtha, Agni, etc.

#### **Effect of *Rasayana* on the human body:**

##### 1. Reduces Inflammation:

- Diminishes levels of inflammation within the body.

##### 2. Enhances Antioxidant Enzymes:

- Amplifies the activity of antioxidant enzymes, contributing to oxidative stress mitigation.

##### 3. Augments Adaptogenic Effects:

- Boosts the adaptogenic effects, aiding the body in adapting to environmental and physiological stressors.

##### 4. Amplifies Immune Modulation and Stimulation:

- Heightens the modulation and stimulation of the immune system, improving its response.

##### 5. Intensifies Free Radical Scavenging of Antioxidants:

- Increases the ability of antioxidants to scavenge free radicals, counteracting oxidative damage.

##### 6. Reduces Mutagenic Effects on DNA:

- Decreases the mutagenic impact on DNA, promoting genomic stability and integrity.

## MATERIAL AND METHODS

Information sourced from diverse Ayurveda texts, contemporary literature, journals, and review articles, focusing on Jara (Ageing), Rasayana, and Ayurvedic herbs impacting various organs and organ systems, has undergone analysis. This comprehensive approach aims to provide a thorough understanding of the Rasayana's impact on organelle ageing.

**Table 1.** Depicts age-wise declination according to Acharya Sharangdhara and the use of *Rasayana* for graceful declination decade-wise [10]

**Table 2.** Depicts *prakruti* wise use of *Rasayana*.

**Table 3.** Depicts organ wise ageing and use of *Rasayana* to delay ageing of organs.

**Table 1.** Classification of *Rasayana* According to Age groups in years: Desired Effect of *Rasayana*

Age (Years)	Property	Rasayana
1-10	<i>Balya</i> ( Childhood)	<i>Suvarnabhasma, Vacha, Kasmiri</i>
11-20	<i>Vridhhi</i> (Growth)	<i>Bala, Shatavari, Ashwagandha</i>
21-30	<i>Chavi</i> (Beauty)	<i>Amalaki</i>
31-40	<i>Medha</i> (Intellect)	<i>Bramhi, Shankhapushpi, acha, Suvarna</i>
41-50	<i>Twaka</i> (Health of Skin)	<i>Jyotishmati, Priyal, Bringaraj</i>
51-60	<i>Dristi</i> (Vision)	<i>Triphala, Shatavari, Jyotishmati</i>
61-70	<i>Sukra</i> (sex)	<i>Atmagupta, Vajikaran Drugs</i>
71-80	<i>Vikrama</i> ( Physical)	<i>Bala, Aamalki</i>
81-90	<i>Buddhi</i> ( Wisdom)	<i>Brahmi, Shankhapushpi</i>
91-100	<i>Karmedriya</i> (Locomotors activity)	<i>Ashwagandha, Bala</i>

**Table 2:** According to *Deha Prakruti*

S.No.	Prakruti	Rasayanas
1.	VataPrakruti	<i>Bala, Ashwagandha, Guduchi, Shankhapushpi, Ghee, Milk Gold.</i>
2.	<i>Pitta Prakruti</i>	<i>Shatavari, Amalaki, Brahmi, Chyavanprash, Milk, Ghee, Silver.</i>
3.	Kapha Prakruti	<i>Vacha, Bakuchi, Brahma Rasayan, Haritaki, Triphala, Honey.</i>

**Table 3:** Ageing Symptoms or changes in Organs and organ systems with effective Rasayana:

S.No.	Organs	Signs of Ageing	Rasayans
1.	Eye (40)	More far-sighted, problem with focusing, difficulty in adjusting to light intensity, perception of hues altered	<i>Triphala and Shatavari, Jyotismati, Yashtimadhu</i>
2.	Nose (60)	The ability to smell declines after age 65, the amount of reduction varies widely between individuals	<i>Nasyam of Anu oil</i>
3.	Skin (25)	Wrinkles (related to decrease mitochondrial function), dryness, dark spots.	<i>Tuvarak, khadir bakuchi, bhallatak, gandhak</i>
4.	Ear (55)	Gradual loss of the ability to hear higher frequencies, starting around age 30; hair grows in auditory canal.	<i>Karnapurana by bilwa tail, tulsi</i>
5.	Brain (20)	Gradual loss of brain tissue (5-10% by age 90), slow reaction, faltering memory, insomnia	<i>brahmi, Mandukparni, Shankhpushpi,</i>
6.	Heart (40)	Thickening of the heart wall, gradual loss of effectiveness as a pumping machine.	<i>Swarna bhasama, guggul</i>
7.	Neuromuscular system (45)	Degeneration of nerves and muscles becomes loose	<i>Bala, Nagbala, Garlic</i>
8.	Hair (30)	Greying, thinning, balding	<i>Bhringaraj, Amalki, Dhatri lauh, louh bhasma</i>
9.	Hormones	The level of several hormones, e.g., GH, DHEA... falls with age, maybe a major cause of ageing.	<i>Shatavari, Ashwagandha, Kallaungi</i>

10.	Kidneys (50)	Weight & volume of the kidneys shrink, marked reduction in the cleansing of impurities from the blood	<i>Gokshura, punarnava</i>
11.	Joints	Cartilage becomes cracks and frays, cushioning fluid gets thinner, tendons and ligaments are less resilient	<i>Shukti bhasma, vanshlochana, ukutandtwak, makshikbhasama, shallaki</i>
12.	Teeth (40)	Teeth gum recession	<i>Amla</i>
13.	Tongue (60)	Sense of taste loses only gradually with age, with equal reduction of all flavours.	<i>Turmeric, Amla</i>
14.	Muscles (30)	Loss of muscular mass, partly due to un-use, other causes include loss of blood flow and energy supply	<i>Ashwagandha, Bala, Masha, Rajat Bhasma</i>
15.	Liver (70)	The ageing process does not affect adversely the liver.	<i>Bhumiamalki, kutaki, tamra bhasma</i>
16.	Lungs (20)	Lose elasticity and capacity (40% between ages 20 and 80)	<i>Vardhaman pippali, chavanprasha, Agastya</i>
17.	Prostate (50)	Reduction in semen making after 60, enlargement in size may cause difficulty to urinate.	<i>Gokshura, varuna, puga</i>
18.	Nerve Demyelination	loss of myelin covering of nerve fibres, which is characteristic of neurological disorders	<i>Ashwagandha, Shankpushpi, Swarna bhasma, lauh bhasama</i>

19.	Reproductive System (35)	Women go through menopause at ages of 45 - 50, reduced level of estrogen affects the whole body. Men's reproductive change with age is more like a reduction than a cessation.	<i>Ashwagandha, Kapikacchu, safed musli, Shatavari, vidarikanda, Shatavari</i>
20.	Prostate (50)	Reduction in semen-making after 60, enlargement in size may cause difficulty in urinating.	<i>Punarnava, gokshur</i>
21.	Face	Wrinkles, facial hair, bags under the eyes, double chin, longer ears, thinning cheek.	<i>Ashwagandha, Bala, Brahmi</i>
22.	Arteries	Cholesterol and calcium buildup, walls thicken, arteries harden, high blood pressure, and risk of heart attack.	<i>Amalki, Dhatri lauh, Bhringaraj, louh bhasma</i>
23.	Body Weight (55-75)	Body weight declines due mostly loss of lean tissue, muscle mass, water, and bone	<i>Ashwagandha, Shatavari, vidarikanda</i>
24.	Immunity	The body's power to combat infection declines; auto-immune responses increase.	<i>All Rasayanas combined</i>
25.	Bones (35)	Loss of bone cells accelerates at about age 35, bones become porous and brittle in the dematerializing process. Osteoporosis is common in women	<i>Shukti bhasam, kukutandtvak, vanshlocana</i>
26.	Breast (35)	Mammary (milk-secreting) glands reduce in size, as does the breast	<i>Shatavari, jeeraka, milk</i>
27.	Stomach	Deterioration in normal functioning	<i>Pippali, bhallatak, haritaki</i>
28.	Large intestine	Absorption capacity decreases	<i>Kutaj, Triphala</i>
29.	Small intestine	Deterioration in normal functioning	<i>Kutaj, Triphala</i>

## **Discussion And Result**

The acknowledgement that numerous organelles experience structural and functional alterations during the natural ageing process is well-established. These changes play a substantial role in the decline of tissue function observed in older individuals.

Physiologists have observed a gradual decline in the performance of organs such as the heart, kidneys, brain, and lungs over the lifespan. This decline involves a loss of cells from these organs, reducing the individual's reserve capacities. The remaining cells in elderly individuals may not function as effectively as those in the young, with certain cellular enzymes becoming less active. This may lead to an extended time required for chemical reactions and, ultimately, cell death. Various organs, such as the lungs, muscles surrounding the rib cage, digestive enzymes, heart blood vessels, reproductive tissues, and the prostate gland, undergo age-related changes that contribute to reduced functionality.

Rasayana, a specialized form of treatment, influences fundamental aspects of the body, including Dhatu (tissues), Agni (digestive fire), and Strotas (channels). Different Rasayana drugs may act with a predominant effect at different levels, operating through varied pharmacodynamic properties. Rasayana's effects are not specific pharmacological actions but complex phenomena involving fundamental factors like Rasa-Samhana, Dhatus, Agni, and Strotas. The goal is to achieve a comprehensive effect, as stated by Aacharya Charak, "Labhopayo Hi Shastanam Rasadinam Rasayanam."

Rasayana produces effects at the level of Rasa by improving specific nutritional values, promoting the best quality of Dhatus. Rasayana Dravyas with properties like Madhura, Guru, Snigdha, and Sheeta act at the level of Rasa, enhancing nutritional values. Some Rasayana Dravyas act at the level of Agni, vitalizing organic metabolism, causing Srotoshodhana, and producing Rasayana effects. Others influence Oja, inducing Bala (strength) and Vyadhikshamatva (immunity).

Herbs like Ashwagandha and Amalaki are examples of Rasayanas with specific effects. Ashwagandha works on the brain, reproductive organs, muscles, and body weight. Amalaki exerts protective effects against eyes, teeth, tongue, and lipid peroxidation, and may prevent telomere erosion, promoting healthy ageing.

Ayurveda mentions organ and tissue-specific Rasayana drugs, such as Medhya Rasayanas

for the brain, Hridya Rasayana for the heart, and Chakshusya Rasayana for the eyes. These Rasayanas may retard ageing and enhance specific organ functions. Exploring drugs that modulate stem cell activity can contribute to developing treatments for neurodegenerative diseases. Rasayana, as a concept, aims to achieve homeostasis and retard the ageing process and associated diseases. The analysis combines classical Ayurvedic knowledge with modern research techniques to understand the effects of Rasayana on organelle ageing.

### **Conclusion**

Ageing is a comprehensive process involving all organs and tissues within the human organism. The unique approach of employing Rasayana Chikitsa to address diseases and rationalize the ageing process stands as a distinctive principle within the Ayurvedic system. Rasayana therapy holds significant potential to enhance the quality of human life, presenting a promising perspective when examined through its textual foundations. Ayurveda provides detailed and explicit guidance on the use of various Rasayanas in both health and disease conditions. In the Ayurvedic system, the treatment of any disease is considered incomplete without the incorporation of Rasayana therapy.

The establishment of the concept of Organelle Ageing, identification of factors contributing to its early onset, and understanding the relationship between the use of specific Rasayanas for organs and organ systems, and their impact on delaying the ageing process, has been articulated. Despite complexities associated with its application, the intangibility of effects, and the requirement for long-term usage, the potential of Rasayana in the current context, where life spans are increasing, and the need for care of the elderly population is growing, deserves a reassessment. A thorough understanding and precise application of this concept within the practice of Ayurveda could contribute to effective and tailored treatments for the elderly, aligning with the evolving healthcare landscape.

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